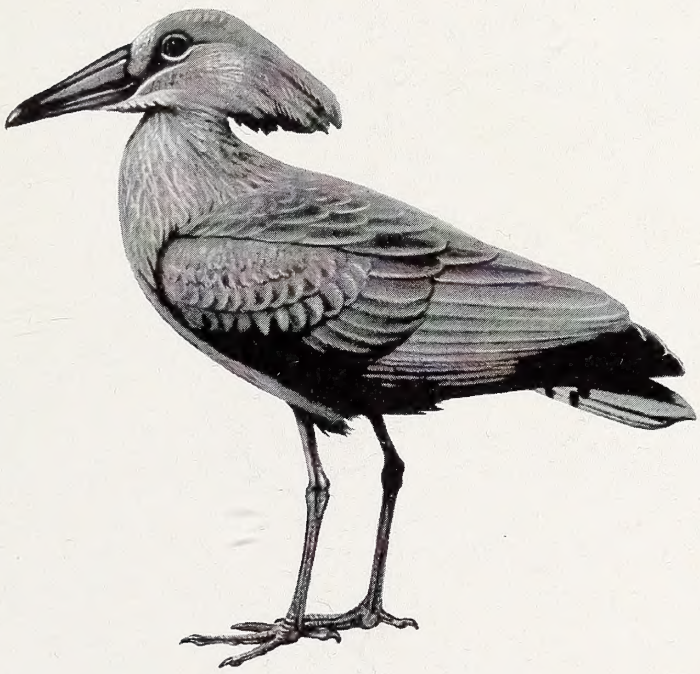
ISSN 0250–4162

SCOPUS



A publication of the
Bird Committee of the
East Africa Natural History Society

Edited by
Mwangi Githiru

Volume 28, December 2008

BirdLife INTERNATIONAL

NatureKenya
The East Africa Natural History Society

SCOPUS

Scopus is published twice a year, or as a combined annual volume, by the Bird Committee of the East Africa Natural History Society. For information on current subscription rates and modes of payment, contact Nature Kenya P.O. Box 44486, G.P.O. 00100, Nairobi, Kenya, tel. +254 20 3749957, E-mail: membershipservices@naturekenya.org or visit the website: www.naturekenya.org. For subscriptions in Uganda contact Nature Uganda, P.O. Box 27034, Kampala, Uganda, tel. +256 41 540719 or E-mail: eanhs@imul.com or visit www.natureuganda.org.

Cover illustration from a gouache painting by P.A. Clancey.

Notes for contributors

Scopus welcomes original contributions on all aspects of the ornithology of eastern Africa, encompassing the area from the Sudan south to Mozambique and including the Indian Ocean islands.

Contributions include original (full) papers, short communications (normally less than two pages in length, including short notes and records) and letters. Original articles and short communications should present some new results that have not been published or been submitted for publication elsewhere. All manuscripts are subject to peer review. They will be assessed by at least one member of the editorial board as well as by independent referees.

Manuscripts must be written in English and should be typed double-spaced throughout with wide (1 inch) margins. When preparing your manuscript, please follow the conventions used in *Scopus* and refer to a recent issue (vol. 21 onwards) for guidance. Some examples of conventions are:

Units: Metric units and their SI equivalents should be used.

Dates: 21 February 2001 [note the order, no comma, not 21st].

Time of day: 13:00 [note colon, no 'hours', 'hrs' or 'h'].

Names of birds: Cape Rook *Corvus capensis* [no comma, no parentheses, no author's name].

References cited in the text: Cite multiple references in chronological order, separated by commas, e.g. (Njoroge & Launay 1998, Mlingwa *et al.* 2001) [note ampersand, italicised '*et al.*', no comma between authors' names and date].

List of references at end of an article: See the examples below for format.

Give names of journals in full. For books, after author(s), year of publication and title, give town followed by the publisher. For example:

Cordeiro, N.J. & Githiru, M. 2000. Con-

(continued on inside back cover)

Scopus 28: 1-14, December 2008

Avian diversity in forest gaps of Kibale Forest National Park, Uganda

Mwangi Githiru[1] and Sileshi Dejene[2]

Abstract

We studied gap avifaunal diversity in eight forest gaps within Kibale National Park using point counts. A total of 348 individuals comprising 55 species were recorded. A species-accumulation curve showed that, although not all possible species were recorded, this was a reliable representation of the entire gap avian diversity of Kibale forest. Next, we categorized the observed avifauna in terms of forest dependence and feeding guilds. Whereas the proportions based on forest-dependency were significantly different from the expected proportions when considering the avian community for the entire forest, those based on feeding guilds were not. Gap size and vegetation cover density both had positive correlations with species richness and abundance, though not always statistically significant. This study shows that gaps significantly contribute to the overall avian species richness of Kibale forest. This could be either through supporting entirely different species, or providing a burst of new resources that enables forest species to extend their home ranges or live at higher densities.

Introduction

Tropical rain forests have often been described as mosaics of different sizes and ages of re-growth. Tree falls and consequent forest gap formations are a very important source of environmental heterogeneity, which has ramifications for ecological diversification, and evolution of rain forests. As a result, gaps, both natural and artificially generated, serve as dynamic patches of forest regeneration and recovery (Kasenene 1989, Richards 1996).

Besides naturally open areas occurring along ridges and river valleys, the commonest natural cause of forest gaps is the falling of large trees caused by wind or lightning, often with a cascading effect. Other natural causes of gap formation include landslides and elephant browsing (Richards 1996). Gaps created by humans stem largely from selective logging and encroachment. While the ecological effects of logging (e.g., Dranzoa 1998) and forest edges

1 This manuscript is based on a study carried out and originally written-up by both authors, but was revised solely by the first author after it became known that the second author was deceased. The first author therefore bears full responsibility for any errors or omissions that remain in this paper.

2 This paper is dedicated to the memory of my co-author Sileshi Dejene who suddenly passed away in 2003 at the tender age of 30. A promising life and career abruptly nipped in the bud; a great and warm persona that is truly missed.

(e.g., Murcia 1995) have been relatively widely studied, far little work has been conducted in forest gaps, particularly in Africa. It is likely that gap effects on birds will depend on several features including gap size, shape, age, vegetation and distance between gaps.

Use of forest gaps by animals varies depending on species-specific requirements and gap-related characteristics. Few studies have specifically addressed the issue of vertebrate responses to gaps in tropical rain forests (e.g., Ngabo & Dranzoa 2001). The effects of gap size and vegetation on fauna in Kibale forest, Uganda, are little known, apart from the studies on rodents and elephants (Kasenene 1984, Struhsaker 1997). The number and uniqueness of rodents in Kibale is much greater in gaps than under forest (non-gap) microhabitats. Additionally, the frequency of elephant visits and the number of gaps used by elephants was significantly greater in the logged forest than in the unlogged forest. Differential use of gaps by understorey birds has been demonstrated from studies conducted in Costa Rica where 40 % of the species found in the gaps were considered to be gap specialists (Levey 1988). There is also some anecdotal evidence suggesting that forest gaps may aid male birds in establishment and maintenance of territorial boundaries. Utilization of forest gaps, especially younger ones, as territorial boundaries may benefit males through increased visibility and song projection (Smith & Dallman 1996). Consequently, gaps are considered as keystone habitats for such species (Struhsaker 1997).

Gaps in Kibale Forest National Park originated primarily from natural tree falls, selective logging and elephant browsing (J.M. Kasenene pers. comm.). No prior studies have investigated the avifaunal composition in gaps of Kibale, and factors likely to influence this. The principal objective of this study was to investigate the effects of gap size and vegetation composition on the avian community in Kibale Forest, by comparing the patterns of occurrence of species in several gaps. We predicted that: (i) forest-dependent species occur less frequently in gaps compared to the forest (and vice versa for the non-forest dependent species), and (ii) size, and vegetation cover and composition of the gaps will affect both local abundance and species composition of birds. As a preliminary study, we hoped to provide some basis for future studies looking into more detailed aspects of the avian diversity in Kibale forest gaps.

Methods

Study area

This study was carried out in July 1997 in Kibale Forest National Park (00°13′ to 00°41′N, 30°19′ to 30°32′E; altitudinal range 1100 to 1590 m). Eight gaps were randomly selected, two in the unlogged and six in the lightly-logged forest compartments within Kibale forest. Their sizes were measured by estimation of gap diameters using an optical rangefinder, from which the area was calculated assuming a circular or elliptical shape. The basic gaps

characteristics were as follows (see *Vegetation sampling* methods further for explanation):

Gap 1: was located Along R btw R15 and R16; 0.11 ha; 25% Canopy Cover CC, 20 % Mid-Strata Vegetation Cover MSVC, 50% Undergrowth Vegetation Cover UGVC, and 100% Ground Vegetation Cover GVC; main tree species was *Markhamia lutea*; and classified as a recent gap

Gap 2: was located Along R 17; 0.16 ha; 40% CC, 50 % MSVC, 50% UGVC, and 70% GVC; main tree species was *Polyschias fulva;* and classified as a recent gap

Gap 3: was located Along 17 btw A17 and B17; 0.14 ha; 50% CC, 30 % MSVC, 70% UGVC, and 100% GVC; main tree species was *Markhamia lutea*; and classified as an old gap from logging

Gap 4: was located Along GLT on trail B; 0.15 ha; 40% CC, 60 % MSVC, 80% UGVC, and 100% GVC; main tree species was *Neobutonia macrocalyx*; and classified as an old non-tree-fall gap along valley

Gap 5: was located Along GLT on trail B after gap 4; 0.22 ha; 10% CC, 10 % MSVC, 75% UGVC, and 100% GVC; main tree species was *Neobutonia macrocalyx*; and classified as an old non-tree-fall gap along valley

Gap 6: was located Along Y after Y21; 0.15 ha; 30% CC, 50 % MSVC, 70% UGVC, and 90% GVC; main tree species was *Macaranga sp.*; and classified as a recent gap

Gap 7: was located Along M on M4; 0.25 ha; 50% CC, 40 % MSVC, 75% UGVC, and 100% GVC; main tree species was *Polyschias fulva*; and classified as an old gap on valley

Gap 8: was located Along L btw L12 and L13; 0.26 ha; 50% CC, 30 % MSVC, 75% UGVC, and 100% GVC; main tree species was *Polyschias fulva*; and classified as an old gap on valley

Bird sampling

We conducted four total counts in each gap using principles of the point count technique (Bibby *et al.* 1992): two in the early morning and two in the late afternoon. The sampling sequence was randomly determined. Each count lasted for 15 minutes where we recorded all birds seen or heard within the gap. Since the gaps were reasonably clear and small, and this being an exploratory study, we observed entire gaps without sub-sampling.

To sort all birds seen, we used two methods. First, we grouped species according to their levels of forest dependence following the classification given in Bennun *et al.* (1996): (i) FF-species (*forest specialists*: true forest birds characteristic of the interior of undisturbed forest; occasionally albeit rarely occurring in non-forest habitats and secondary forest if their particular ecological requirements are met, but breeding almost invariably within undisturbed forest); (ii) F-species (*forest generalists*: occur fairly commonly

in both undisturbed and secondary forest, forest strips, edges and gaps, but often breed within the forest interior); and (iii) f-species (*forest visitors*: birds repeatedly recorded in the forest interior but are not dependent on it, being more common in non-forest habitats, where they are most likely to breed). Any species not included in the Bennun *et al.* list was categorised as non-forest (nf). Second, birds were grouped into five categories based on four main feeding habits viz. fly-catching (*fly catcher*), gleaning for insects (*arboreal gleaner*), fruit eating (*frugivore*) and ground feeders (*ground feeder*), the fifth being a combination of two or more of these (*catholic feeder*). We used information in the Birds of Africa series for this classification (Urban *et al.* 1986, 1997, Keith *et al.* 1992).

From the entire species list of the birds of Kibale Forest (Skorupa 1983), we used the two classifications above to determine overall frequencies based on forest dependency and feeding behaviour. These were the 'expected' proportions that would then be compared to the 'observed' frequencies based on the species that were recorded in the gaps during the course of this study. In calculating the expected values, we excluded species not categorized by Bennun *et al.* (1996) (i.e., non-forest [nf]-species), as well as those that we would not have expected to see through our sampling protocols (e.g., nocturnal birds like owls and nightjars, and water birds), and those not obviously discernable as being within or out of the gap, usually flying over (e.g., most raptors, swallows, swifts and martins).

Vegetation sampling

We visually estimated the (percent) vegetation cover of the canopy (CVC: > 20 m), mid storey (MSVC: 2-20 m), undergrowth (UGVC: 0-2 m) and ground (GVC) at five points within each gap: the centre and four points on each compass direction near the far edge of the gap. The sum of the four cover types gave a rough index of overall vegetation cover (foliage) density at each point, and the five points were used to calculate a mean percentage cover value for the entire gap. We also noted any tree, shrub or herb species within the gaps that was in flower or fruit at the time.

Statistical analyses

Besides descriptive analyses summarising the data, chi-square tests in STATISTICA (StatSoft 2001) were used to check the goodness of fit of our data with the previously defined characteristics on forest birds (as described above). Spearman's rank correlation coefficients were calculated to check for significant correlations between gap and habitat variables with bird-related variables, namely total number of encounters, individuals, species, and FF species. To compute bird densities for each gap, total number of individuals seen over the four counts was divided by 4 to obtain mean number per count which was then divided by the gap size.

Results

Overall

We observed 358 individuals during our study, comprising of 55 species, excluding all species that were not obviously discernable as being within or out of the gap, usually flying overhead e.g., raptors, swallows, and swifts (Appendix). The species-accumulation curve plotted for successive counts in all gaps (morning and afternoon counts were regarded as independent) showed a steady increase but with a slow approach to an asymptote (Figure 1). This was mainly because only a minority of the 55 species occurred in more than five separate gaps, with more than 80% being recorded in just one or two gaps (Figure 2).

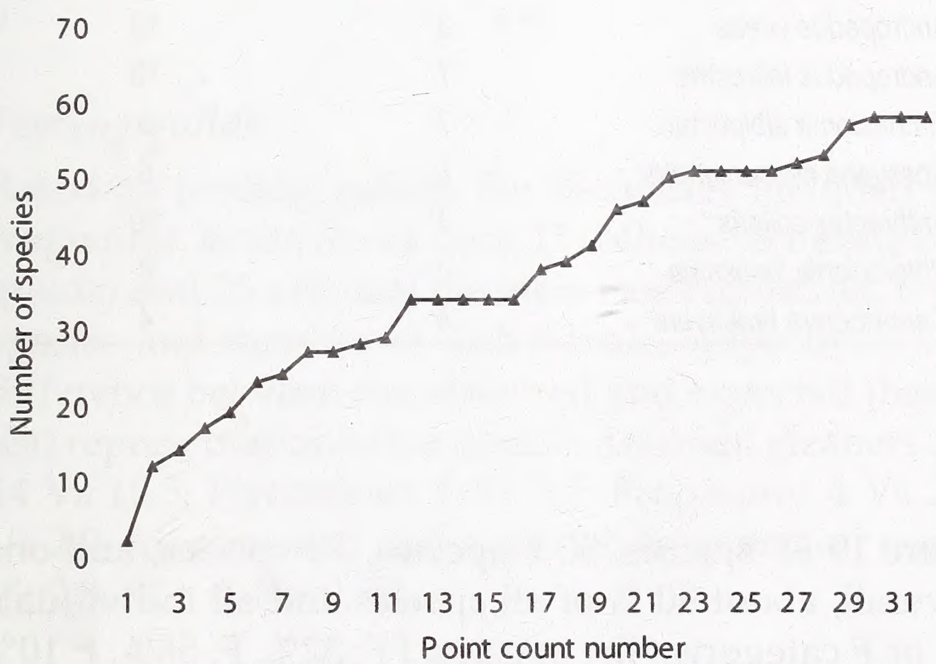


Figure 1. Species-accumulation curve for successive counts in eight gaps at Kibale Forest.

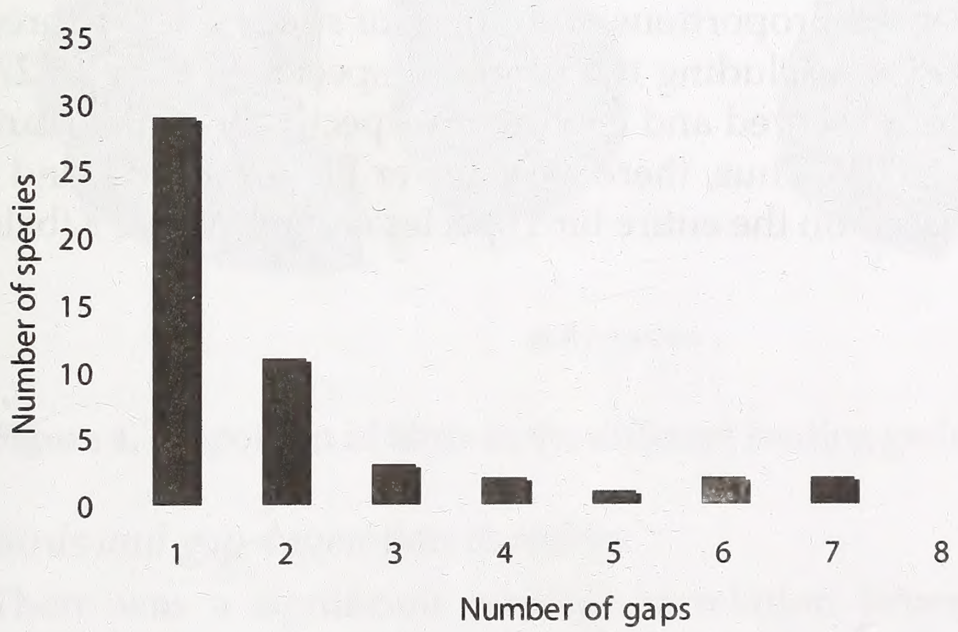


Figure 2. Bird species incidence in eight gaps of Kibale Forest National Park.

The commonest species in terms of both the number of times they were encountered and the total number seen during the study are provided in Table 1. Obligate frugivores such as Ross's Turaco *Musophaga rossa* and Great Blue Turaco *Corythaeola cristata*, as well as classic FF species like Petit's Cuckoo Shrike *Campephaga petiti*, Jameson's Wattle-eye *Dyaphorophyia jamesoni*, and White-headed Wood Hoopoe *Phoeniculus bollei*, were least common.

Table 1. The ten commonest bird species in gaps of Kibale Forest National Park (the entire list of species seen during this study is given in the Appendix).

English name	Scientific name	Total Encounters	Total Number seen
Black-faced Rufous Warbler	*Bathmocercus rufus*	17	24
Olive Green Camaroptera	*Camaroptera chloronata*	15	19
Olive Sunbird	*Nectarinia olivacea*	14	23
Little Greenbul	*Andropadus virens*	8	18
Yellow-whiskered Greenbul	*Andropadus latirostris*	7	13
Scaly-breasted Illadopsis	*Trichastoma albipectus*	7	9
Blue-shouldered Robin Chat	*Cossypha cyanocampter*	5	6
Collared Sunbird	*Anthreptes collaris*	4	10
Joyful Greenbul	*Chlorocichla laetissma*	4	8
Gray-backed Camaroptera	*Camaroptera brachyura*	4	4

Forest dependency

Of the 50 species, there were 19 FF-species, 30 F-species, 5 f-species, and one non-forest species (nf). Overall, about 90 % of all species and all individuals seen were either in the FF or F categories (by species: FF: 32%, F: 56%, f: 10% and nf: 2%; by number of individuals: FF: 45%, F: 48%, f: 6% and nf: 1%). This was also the case for each of the eight gaps, but with varying proportions of FF and F species (Figure 3). There was a significant difference between the overall expected and observed proportions of number of species in the three forest dependency categories (excluding the single nf species): FF 16 Vs 27; F 28 Vs 21; and f 5 Vs 2, for observed and expected, respectively (Chi-square test: $\chi^2 = 11.0$, df = 2, $P = 0.004$). Thus, there were fewer FF but more F and f than would be expected based on the entire bird species community at Kibale Forest.

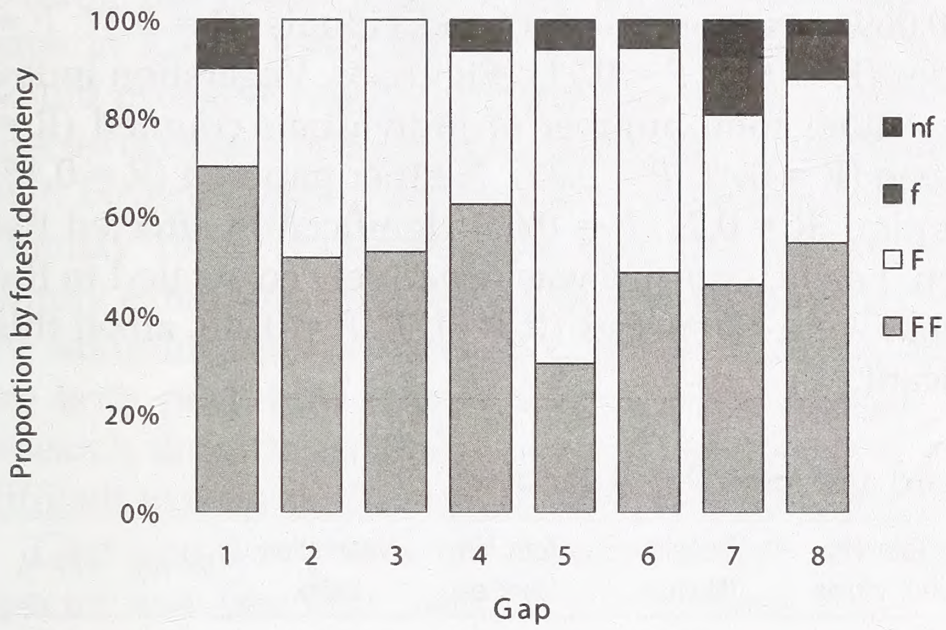
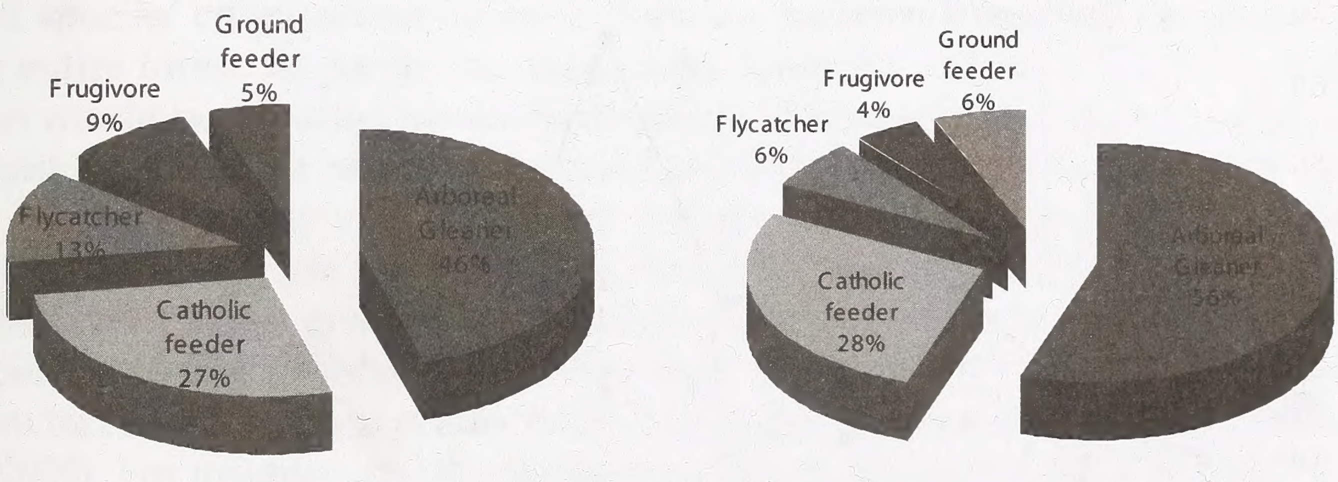


Figure 3. Percentage of bird species in the different forest-dependency categories for each gap separately.
FF: forest specialists
F: forest generalists
f: forest visitors
nf: non-forest

Feeding guilds

Based on feeding guilds, the 55 species included three ground feeders, five frugivores, seven flycatchers, 15 catholic feeders (a combination of two or more guilds) and 25 arboreal gleaners (see Figures 4a, b for relative proportions by species and number of individuals, respectively). There was no significant difference between the observed and expected (based on entire forest species list) representation of the guilds: Arboreal gleaners 23 Vs 25.5; Catholic feeders 14 Vs 15.5; Flycatchers 6 Vs 3.7; Frugivores 4 Vs 2.4; and Ground feeders 3 Vs 2.9, for observed and expected frequencies, respectively (Chi-square test: χ^2=2.9, df = 4, P = 0.58).



a) By species **b)** By numbers

Figure 4. Proportion of birds in the different feeding guilds in gaps of Kibale Forest.

Birds and gap-vegetation variables

There was a significant positive correlation between the total number of individuals and number of bird species seen within each gap (Spearman R = 0.75, P = 0.030, n = 8) (data in Table 2). Bird densities within the eight

gaps ranged between 22.7 and 50 individuals ha^{-1}. Gap size was positively correlated (though always marginally non-significant) to number of encounters (Spearman R = 0.67, P = 0.069, n = 8), number of individuals (R = 0.57, P = 0.14), and number of species (R = 0.61, P = 0.11) (Figure 5). Vegetation index did not significantly affect either total number of individuals counted (R = 0.17, P = 0.69) or species seen (R = 0.41, P = 0.32). Neither gap size (R = 0.45, P = 0.26) nor vegetation index (R = 0.22, P = 0.60) significantly affected the numbers of FF-species seen. Lastly, gap size was negatively correlated to the proportion of birds seen that were FF species (R = -0.50, P = 0.20), albeit this correlation was not significant.

Table 2. Summary data for bird and gap-related variables.

Gap	Gap size (m^2)	No of Encounters	Total No Individuals	Density (No/ha)	Total No. Species	Vegetation Index	FF No.	FF %
1	1100	10	10	22.7	6	145	7	70
2	1600	16	31	48.4	11	190	16	51.6
3	1400	10	17	30.4	7	240	9	52.9
4	1500	22	32	53.3	15	240	20	62.5
5	2200	33	66	75	19	225	20	30.3
6	1500	20	35	58.3	13	240	17	48.6
7	2500	17	26	26	14	265	12	46.2
8	2600	23	33	31.7	14	255	18	54.5

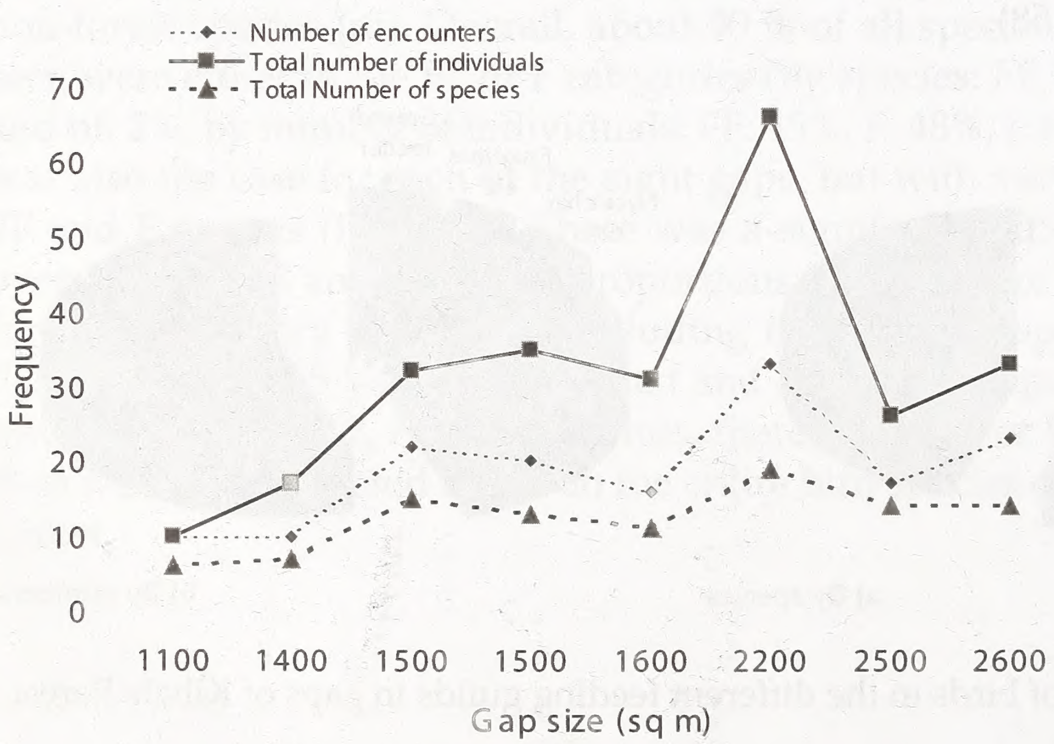


Figure 5. Relationship between gap size and bird-related variables: number of encounters, individuals and species seen.

Discussion

Overall, our results indicate that we observed many of the species that utilize gaps in Kibale forest during this study, though increasing number of gaps would probably result in a slight but steady increase in species because many species occurred in only one or two gaps. The gaps surveyed also had relatively high bird densities compared to other studies elsewhere (e.g., Nilsson 1979, Thiollay 1994). It was possible that bird species recorded in the gaps were simply extending their ranges mainly for foraging purposes, especially since the sampling times were early in the morning and late in the afternoon, which are both peak bird-activity time periods (Davies 2002). Still, with so little research done on territory sizes and behaviour of gap-specialist species, it is difficult to exclude that stable territories indeed existed in these gaps.

Gap size was positively correlated with the number of individuals and species seen (see also Greenberg & Lanham 2001). There was also a negative trend showing a decline of the proportion of FF species with increasing gap size, suggesting that FF species were replaced by F and f species in large gaps. It is hence likely that small openings created by tree-fall gaps do not significantly affect true forest species, and may increase avian diversity at a landscape scale by increasing habitat heterogeneity. The importance of vegetation structure within the gaps was not very clear from our quantitative analyses, although some trends may have failed to attain statistical significance owing to our small sample sizes. Yet, there were some anecdotal indications; for instance, the high canopy cover in Gap 8 would explain the occurrence of Petit's Cuckoo Shrike there, a strict forest canopy species (Zimmerman *et al.* 1996).

The chi-square test for forest dependence was significant, showing that, in terms of forest dependence (proportion of FF and F species), the within-gap bird species' composition differed from the pattern of forest dependence for the entire forest. In particular, there were fewer FF but more F and f-species than would be expected based on the entire bird species community at Kibale Forest. This is what one would expect in forest gaps because most of the true FF species probably shy away from the openings, as has also been reported from elsewhere (Dale *et al.* 2000; Rail *et al.* 1997; Sekercioglu 2002). Conversely, gaps favour more generalist species (F and f) which take advantage of the superabundance of food due to more light and typically denser foliage cover from increased primary productivity (Greenberg & Lanham 2001, Wunderle *et al.* 2006). For instance, the Black-throated Green Warbler in the US was found to preferentially select gaps in response to there being more insects in gaps (Smith & Dallman 1996). Other studies have also demonstrated differences in assemblages of birds captured in gaps and the surrounding forest understorey, which have been correlated to an increased insect, fruit, and total foliage abundance in forest gaps (Blake & Hoppes 1986, Martin & Karr 1986). Lastly, studies in Costa Rica showed that some gap specialist bird species dominated forest gaps (Levey 1988), as the Black-faced Rufous Warbler, Olive Green

Camaroptera and Olive Sunbird probably did in our study.

Unlike for forest dependence, the gap avian composition in terms of feeding guilds was found to be a subset of the entire forest's feeding guilds composition. The presence of specialized feeders was usually directly attributed to the occurrence of their food requirements e.g. the Great Blue Turaco and Ross's Turaco were observed to be feeding on fruiting trees in Gaps 5 and 3, respectively. This has been found to be the case in other studies too, such as a recent study in Argentina showing that as a consequence of a high abundance of fruits and flowers in gap understory, old gaps were extensively used by understory frugivores-insectivores (Zurita & Zuleta 2008).

In conclusion, given that our gap assemblage differed from the overall forest assemblage, this study demonstrates the importance of gaps for maintaining forest avian diversity. Gaps increase heterogeneity of the vegetation composition and structure, thereby broadening the range of microhabitats and niches for birds to colonize, even if temporarily. Studies on biodiversity of forest gaps remain rather scant in Afrotropical ecosystems. Future studies should aim at getting good controls for vegetation (structure and composition), size and age because this affects the vegetation types present. This would help tease out how each factor affects avian diversity (richness and abundance), as well as enable examination for interactions between them such as gap size and age, gap size and vegetation structure. Finally, long term studies would clarify patterns of utilization of gaps (e.g., species that utilize the gaps year-round), real forest specialists that (almost) never visit gaps, and inter-gap movements by forest birds. A better understanding of the role of small scale disturbances—such as forest gaps—is critical if forest managers are to maintain high quality habitat for forest biota.

Acknowledgements

We wish to thank our Tropical Biology Association (TBA) project supervisor Dr. Peter Jones whose wealth of knowledge we heavily exploited and relied upon. J. Kasenene was a great help in the field. Great thanks to the TBA staff and our fellow course mates for their constructive criticisms of our study. Luca Borghesio and an anonymous reviewer provided very helpful comments to an earlier draft of this article. Finally, we thank our sponsors for the TBA course. Write-up of this manuscript was initiated when MG held a Marie Curie post-doctoral fellowship based at the University of Antwerp, Belgium.

References

Bennun, L., Dranzoa, C. & Pomeroy, D. 1996. The forest birds of Kenya and Uganda. *Journal of the East African Natural History Society* 85: 23-48.

Bibby, J.C., Burgess, D.N., & Hill, D.A. 1992. *Bird Census Techniques*. London: Academic Press.

Blake, J.G., & Hoppes, W.G. 1986. Influence of resource abundance on use of tree-fall gaps by birds in an isolated woodlot. *Auk* 103: 328-340.

Dale, S., Mork, K., Solvang, R., & Plumptre, A.J. 2000. Edge effects on the understorey bird community in a logged forest in Uganda. *Conservation Biology* 14: 265-276.

Davies, G. 2002. *African Forest Diversity: a field survey manual for vertebrates.* Oxford, UK: Earthwatch Europe.

Dranzoa, C. 1998. The avifauna 23 years after logging in Kibale National park, Uganda. *Biodiversity and Conservation* 7: 777-797.

Greenberg, C.H. & Lanham, J.D. 2001. Breeding bird assemblages of hurricane-created gaps and adjacent closed canopy forest in the southern Appalachians. *Forest Ecology and Management* 154: 251-260.

Kasenene, J.M. 1984. The influence of selective logging on rodent populations and the regeneration of selected tree species in Kibale Forest, Uganda. *Tropical Ecology* 25: 179-95.

Kasenene, J.M. 1987. *The influence of selective logging, felling intensity and gap-size on the regeneration of a tropical moist rain forest in Kibale Forest Reserve, Uganda.* Unpublished PhD Thesis. Michigan State University, East Lansing.

Keith, S., Urban, E.K., & Fry, C.H. 1992. *The Birds of Africa. Vol IV.* London: Academic Press Inc. Ltd.

Levey, D.J. 1988. Tropical Wet Forest Treefall Gaps and Distributions of Understory Birds and Plants. *Ecology* 69: 1076-1089.

Martin, T.E. & Karr, J.R. 1986. Patch utilization by migrating birds: resource oriented? *Ornis Scandinavica* 17: 165-174.

Murcia, C. 1995. Edge effects in fragmented forests: implications for conservation. Trends of Ecology and Evolution 10: 58-62.

Ngabo, C.K.M., & Dranzoa, C. 2001. Bird communities in gaps of Budongo Forest Reserve, Uganda. *Ostrich Supplement No.* 15: 38-43.

Nilsson, S.G. 1979. Density and Species Richness of Some Forest Bird Communities in South Sweden. *Oikos* 33: 392-401.

Thiollay, J.M. 1994. Structure, Density and Rarity in an Amazonian Rainforest Bird Community. *Journal of Tropical Ecology* 10: 449-481.

Rail, J.-F., Darveau, M., Desrochers, A. & Huot, J. 1997. Territorial Responses of Boreal Forest Birds to Habitat Gaps. *The Condor* 99: 976-980.

Richards, P.T. 1996. *The Tropical Rain Forest: an ecological study.* Cambridge: Cambridge University Press.

Sekercioglu, C.H. 2002. Effects of forestry practices on vegetation structure and bird community of Kibale National Park, Uganda. *Biological Conservation* 107: 229-240.

Skorupa, J. P. 1983. *Kibale Forest bird Checklist.* New York, New York Zoological Society Publication. 11pp.

Smith, R., & Dallman, M. 1996. Forest gap use by breeding Black-throated Green Warblers. *Wilson Bulletin* 108: 588-591.

StatSoft, I. 2001. *STATISTICA (data analysis software system), Version 6.* Tulsa: StatSoft, Inc.

Struhsaker, T.T. 1997. *Ecology of an African Rain Forest: Logging in Kibale and the conflict between conservation and exploitation.* Gainesville: University Press of Florida.

Urban, E.K., Fry, C.H. & Keith, S. 1986. *The Birds of Africa. Vol. II.* London: Academic Press Inc. Ltd.

Urban, E.K., Fry, C.H. & Keith, S. 1997. *The Birds of Africa. Vol. V.* San Diego, Academic Press Inc. Ltd.

Wunderle, J.M.J., Henriques, L.M.P. & Willig, M.R. 2006. Short-Term Responses of Birds to Forest Gaps and Understory: An Assessment of Reduced-Impact Logging in a Lowland Amazon Forest *Biotropica* 38: 235-235.

Zimmerman, D.A., Turner D.A., & Pearson D.J. 1996. *Birds of Kenya and Northern Tanzania.* South Africa: Russel Friedman Books.

Zurita, G. A., & G. A. Zuleta. *In press.* Bird use of logging gaps in a subtropical mountain forest: The influence of habitat structure and resource abundance in the Yungas of Argentina. *Forest Ecology and Management.*

Mwangi Githiru (Corresponding author)
Ornithology Section, Department of Zoology, National Museums of Kenya, P.O. Box 40658 00100, Nairobi, Kenya
Department of Biology, Laboratory of Animal Ecology, University of Antwerp, Universiteitsplein 1, B-2610, Wilrijk, Belgium
E-mail for correspondence: mwangi_githiru@yahoo.co.uk
Sileshi Dejene (deceased)
(Address at the time of the research) P.O. Box 80455 Addis Ababa, Ethiopia

Scopus 28: 1-14, December 2008
Received December 2007

Appendix

Classification of the 55 bird species recorded in eight gaps at Kibale Forest during this study.

English Name	Scientific Name	Family	Forest Dependency	Feeding Guild
Great Blue Turaco	*Corythaeola cristata*	Musophagidae	F	Frugivore
Ross's Turaco	*Musophaga rossa*	Musophagidae	F	Frugivore
Yellowbill	*Ceuthmochares aereus*	Cuculidae	F	Gleaner
Black Bee-eater	*Merops gularis*	Meropidae	FF	Flycatcher
Broad-billed Roller	*Eurystomus glaucurus*	Coraciidae	f	Flycatcher
White-headed Wood-Hoopoe	*Phoeniculus bollei*	Phoeniculidae	FF	Gleaner
African Pied Hornbill	*Tockus fasciatus*	Bucerotidae	F	Mixed
Black and White Casqued Hornbill	*Bycanistes subcylindricus*	Bucerotidae	F	Frugivore
Hairy-breasted Barbet	*Lybius hirsutus*	Capitonidae	F	Frugivore
Speckled Tinkerbird	*Pogoniulus scolopaceus*	Capitonidae	F	Mixed
Golden-rumped Tinkerbird	*Pogoniulus bilineatus*	Capitonidae	F	Mixed
Yellow-crested Woodpecker	*Dendropicos xantholopus*	Picidae	F	Gleaner
Yellow-whiskered Greenbul	*Andropadus latirostris*	Pycnonotidae	F	Mixed
Joyful Greenbul	*Chlorocichla laetissma*	Pycnonotidae	F	Mixed
Little Greenbul	*Andropadus virens*	Pycnonotidae	F	Mixed
Honeyguide Greenbul	*Baeopogon indicator*	Pycnonotidae	FF	Mixed
Cameroon Sombre Greenbul	*Andropadus curvirostris*	Pycnonotidae	FF	Mixed
Common Nicator	*Nicator chloris*	Pycnonotidae	F	Gleaner
Red-tailed Bristlebill	*Bleda syndactyla*	Pycnonotidae	FF	Mixed
Scaly-breasted Illadopsis	*Trichastoma albipectus*	Timaliidae	FF	Ground
Blue-shouldered Robin Chat	*Cossypha cyanocampter*	Turdidae	F	Ground
Rufous Thrush	*Stizorhina fraseri*	Turdidae	F	Ground
African Dusky Flycatcher	*Muscicapa adusta*	Muscicapidae	F	Flycatcher
Grey-throated Flycatcher	*Muscicapa griseigularis*	Muscicapidae	FF	Flycatcher
Northern Black Flycatcher	*Muscicapa edolioides*	Muscicapidae	F	Flycatcher
African Shrike Flycatcher	*Bias flammulatus*	Platysteiridae	FF	Flycatcher
Gray-backed Camaroptera	*Camaroptera brachyura*	Sylviidae	f	Gleaner
Olive Green Camaroptera	*Camaroptera chloronata*	Sylviidae	FF	Gleaner
Black-headed Apalis	*Apalis melanocephala*	Sylviidae	F	Gleaner
Green Hylia	*Hylia prasina*	Sylviidae	F	Gleaner
Buff-throated Apalis	*Apalis rufogularis*	Sylviidae	FF	Gleaner
Black-faced Rufous Warbler	*Bathmocercus rufus*	Sylviidae	FF	Gleaner
Banded Prinia	*Prinia bairdii*	Sylviidae	F	Gleaner
Masked Apalis	*Apalis binotata*	Sylviidae	FF	Gleaner
Yellow White-eye	*Zosterops senegalensis*	Zosteropidae	f	Gleaner
Common Wattle-eye	*Platysteira cyanea*	Platysteiridae	f	Gleaner
Chestnut Wattle-eye	*Dyaphorophyia castanea*	Platysteiridae	FF	Gleaner
Jameson's Wattle-eye	*Dyaphorophyia jamesoni*	Platysteiridae	FF	Gleaner
Bocage's Bush Shrike	*Malaconotus bocagei*	Malaconotidae	F	Gleaner

English Name	Scientific Name	Family	Forest Dependency	Feeding Guild
Lühder's Bush Shrike	*Laniarius luehderi*	Malaconotidae	F	Gleaner
Petit's Cuckoo Shrike	*Campephaga petiti*	Campephagidae	FF	Gleaner
Velvet-mantled Drongo	*Dicrurus modestus*	Dicruridae	F	Flycatcher
Western Black-headed Oriole	*Oriolus brachyrhynchus*	Oriolidae	F	Mixed
Purple-headed Glossy Starling	*Lamprotornis purpureiceps*	Sturnidae	F	Mixed
Green-throated Sunbird	*Nectarinia rubescens*	Nectariniidae	F	Gleaner
Collared Sunbird	*Anthreptes collaris*	Nectariniidae	F	Gleaner
Olive Sunbird	*Nectarinia olivacea*	Nectariniidae	FF	Gleaner
Blue-throated Sunbird	*Nectarinia cyanolaema*	Nectariniidae	FF	Gleaner
Veillot's Black Weaver	*Ploceus nigerrimus*	Ploceidae	f	Mixed
Yellow-mantled Weaver	*Ploceus tricolor*	Ploceidae	FF	Mixed
Red-headed Malimbe	*Malimbus rubricollis*	Ploceidae	FF	Gleaner
Dark-backed Weaver	*Ploceus bicolor*	Ploceidae	F	Gleaner
Gray-headed Negro Finch	*Nigrita canicapilla*	Estrildidae	F	Mixed
Black-bellied Seedcracker	*Pyrenestes ostrinus*	Estrildidae	F	Frugivore
Yellow-fronted Canary	*Serinus mozambicus*	Fringillidae	nf	Mixed

Scopus 28: 15-24, December 2008

Avifauna of Ishaqbini Community Conservancy in Ijara District, NE Kenya

Peter Njoroge, Muchai Muchane, Wanyoike Wamiti, Dominic Kimani Kamau, and Mwangi Githiru

Ishaqbini community conservancy, in the arid northern-eastern Kenya was established in 2006 by local pastoralists as a community initiative to safeguard their wildlife heritage especially the endemic Hirola *Beatragus hunteri*. Prior to this survey there were no known recent avifaunal surveys for the area despite the fact that the conservancy lies adjacent to the relatively well-known lower Tana River forests, an important bird area (Bennun & Njoroge 1999), as well as the East Africa coast forests endemic bird area (Stattersfield *et al*. 1998). In this paper we present the results of an avifaunal survey of the conservancy that includes a description of the bird assemblages in the conservancy, and an annotated account of some species of global and regional conservation concern occurring there.

Study area and methods

Ishaqbini Community Conservancy (01° 55′S and 040° 10′ E; Figure 1) is located in Ijara District, North Eastern Province of Kenya on land designated as Trust Land. The conservancy covers an approximate area of 72 km^2. It is bordered to the west by Tana River Primate Reserve and by the Garissa-Lamu road to the East. The area is generally low-lying with elevations of between 39 and 65 m a.s.l., and receives a mean annual rainfall of about 500 mm during two rainy seasons, April to June and October to December. However, rainfall patterns in Ijara District are greatly influenced by the coastal monsoons, making the area wetter and cooler than the neighbouring arid districts. The Transboundary Environmental Project (TEP 2004) described the habitat in the conservancy as mainly composed of closed to open woody thickets, open low shrubs and shrub-savannah. Lowland evergreen riverine forests occur in patches on alluvial sediment deposits along the boundary with Tana River Primate Reserve. Apart from being a stronghold for the Hirola, the Conservancy has an impressive diversity of wildlife that include the endangered African Wild Dog *Lycaon pictus*, African Elephant *Loxodonta africana*, Cheetah *Acinonyx jubatus* (occasional visitor), Desert Warthog *Phacochoerus aethioopicus* and Somali Bush Baby *Galago gallarum*. The region is sparsely populated by pastoralist Somali communities.

Avifaunal surveys of the conservancy were conducted in two separate periods: the first in February 2007 (to coincide with the dry season) and the second in June 2007 (to coincide with the wet season). We used a combination

of mist-netting (total effort: 1392 net-metre hours), point counts (total: 70 point counts), timed species counts (total: 14 hours) and opportunistic observations to compile a bird species checklist for the conservancy. All mist netting sites and point count transects were geo-referenced for future monitoring purposes. Our nomenclature and systematics follow Zimmerman *et al.* (1996).

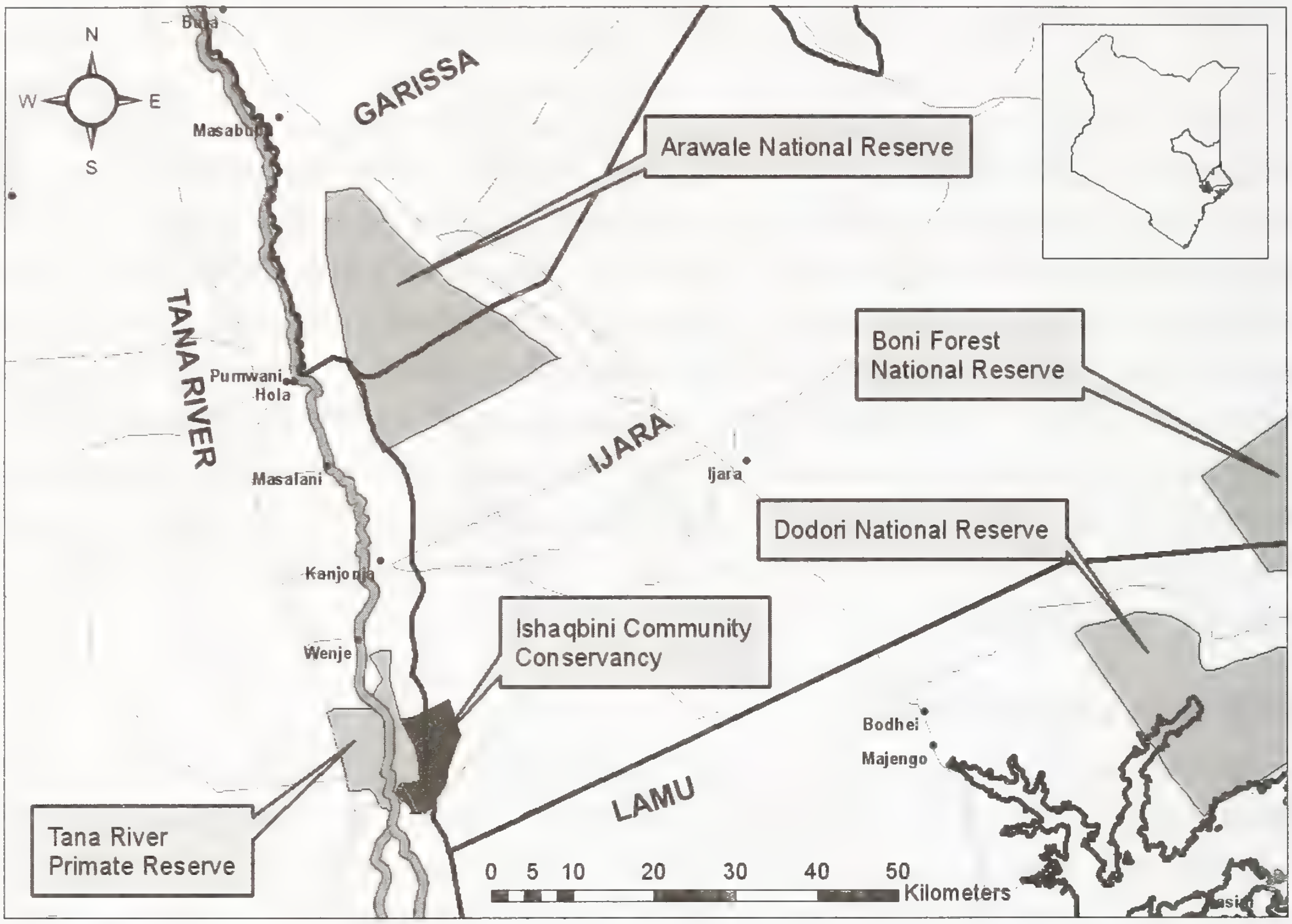


Figure 1. Map of the study site showing the location of the Ishaqbini Community Conservancy.

Results

A total of 184 bird species of 55 families were recorded over a total period of 11 days covering both the dry and wet seasons. Our species list (see Appendix) included 16 Palaearctic migrants and 7 Afrotropical migrants. The list also includes six species listed as rare by the Ornithological Sub-committee of the East Africa Natural History Society (OS-c 1996). Fischer's Turaco *Tauraco fischeri* was the only globally threatened species (IUCN 2008) recorded in the conservancy, but 13 species listed in East Africa's regional red data list (Bennun & Njoroge 1996, Bennun *et al.* 2000) were also recorded. Among the 13 species was one vulnerable (R-VU), eight regionally near-threatened (R-NT) and three regional responsibility species (RR). We also noted range extensions for 20 species (Appendix), most of which had never been recorded beyond the Tana River (Lewis & Pomeroy 1989).

Twenty-three species characteristic of the Somali-Masai biome and seven species characteristic of East African Coastal biome were recorded. The East African Coast biome species recorded were Fischer's Turaco, Carmine Bee-eater *Merops nubicus,* Mangrove Kingfisher *Halcyon senegaloides*, Northern Brownbul *Phyllastrephus strepitans*, Brown-breasted Barbet *Lybius melanopterus*, Mombasa Woodpecker *Campethera mombassica* and Black-bellied Starling *Lamprotornis corruscus*. There were also coastal races of some common species such as Tropical Boubou *Lanius aethiopicus sublacteus,* Black-backed Puffback *Dryoscopus cubla affinis* and Lilac-breasted Roller *Coracias caudata lorti.*

Species of conservation concern

Thirteen species listed in East Africa's Regional Red Data List (Bennun & Njoroge 1996) were recorded. The following are brief notes for some of these species.

Fischer's Turaco (G-NT)

Listed as near-threatened by IUCN (IUCN 2008) and a regional endemic, this is one of the seven species that define the East Africa coast forests endemic bird area (Stattersfield *et al.* 1998). It has a range that extends from Boni in Kenya south to Tanga in Tanzania, and inland along the Tana River to Garsen and Bura (Zimmerman *et al.* 1996). Three individuals were observed once in the riverine forest bordering Tana River Primate Reserve during the first survey period in February 2007. However, the subsequent wet season visit to the area did not record the species.

Saddle-billed Stork *Ephippiorhnchus senegalensis* (R-VU)

This stork is known to breed in the lower parts of the Tana River (Zimmerman *et al.* 1996) but it is rare elsewhere in the country probably due to lack of suitable habitat. A single individual was recorded during the wet season on cultivated floodplains in the southern parts of Ishaqbini Community Conservancy.

Woolly-necked Stork *Ciconia episcopus* (R-NT)

Like the Saddle-billed Stork, the threatened regional status maybe due to shrinking of its preferred habitats. It is known to be mostly found in the coastal lowlands in East Africa where it is usually solitary or in pairs (Zimmerman *et al.* 1996, Britton 1980). We recorded several hundred soaring above the Tana River at Baomo during the dry season survey in February 2007. There are reports that they may exhibit some local movements where they flock together in several hundreds (del Hoyo *et al.* 1992). Only a single individual was recorded during the wet season survey in June 2007 flying over the cultivated floodplain in the south of Ishaqbini Community Conservancy.

Mombasa Woodpecker *Campethera mombassica* (RR)

This species characteristic of the East Africa coast biome was recorded once in *Acacia* woodlands at Kitere in the southern part of the conservancy.

Zimmerman *et al.* (1996) describe it as locally fairly common in forest and coastal woodland but it was not common in Ishaqbini.

Violet-breasted Sunbird *Nectarinia chalcomelas* (R-NT)

Considered rare (OS-c 1996), this species inhabits the moist coastal scrub and grassy thickets in area from Somali border to Kiunga and inland to Ijara (Zimmerman *et al.* 1996). The species was regularly seen during the survey in *Acacia* thickets and one individual was caught in riverine woodland during the wet season survey in June 2007.

Other regionally threatened species recorded in Ishaqbini Community Conservancy include Green-backed Heron *Butorides striatus* (R-NT), Purple Heron *Ardea purpurea* (R-NT), Goliath Heron *Ardea goliath*(R-NT), Grey Heron *Ardea cinerea* (R-NT), Great Cormorant *Phalacrocorax carbo* RR), Long-tailed Fiscal *Lanius cabanisi* (RR) and Pink-breasted Lark *Mirafra poecilosterna* (RR).

Discussion

With 184 bird species recorded in two relatively short surveys, Ishaqbini Community Conservancy has fairly high species richness. This may be attributed to the diversity of habitats within the conservancy as well as its location at the intersection of two bio-diverse biomes—Somali-Masai and East Africa Coastal Forests biomes. The conservancy compares favourably with other frequently visited bird-watching hotspots in the region, such as Arabuko-Sokoke Forest with about 230 species (Fanshawe 1995). Estimates obtained based on the Bird Atlas of Kenya (Lewis & Pomeroy 1989) and databases held at the Ornithology section of the National Museums of Kenya, the number of species expected for this area (Quarter Degree Square 79c-Lewis & Pomeroy 1989) is about 300 species.

Given the numbers of Somali-Masai and East Africa Coastal Forests biome species present, the Ishaqbini Community Conservancy would qualify as an Important Bird Area (Fishpool 1996). However, numbers of each biome species recorded are low as compared to other IBAs in the region. For example, while the neighbouring Tana River forests IBA has 19 of the 30 Kenyan species of the East African Coastal Forests biome (Bennun & Njoroge 1999), only seven were recorded at Ishaqbini. The conservancy also compares poorly with other Somali-Masai biome IBAs e.g. Tsavo East National Park has 60 of the 92 Kenyan Somali-Masai biome species as compared to only 23 recorded at Ishaqbini. Still, it is worth noting that, firstly, our checklist is unlikely to be complete and more species may yet be recorded with more intensive surveys, and secondly, the other protected areas, particularly Tsavo, are much larger. Besides, Ishaqbini is unique in having reasonable numbers of species representative of both biomes. The conservancy is clearly delimitable from the surrounding areas, large enough to stand alone and hence amenable to conservation independently. Finally, being a conservation initiative of the

local community themselves, the conservancy could serve as the ideal example for neighbouring communities to emulate.

Acknowledgements

We owe many thanks to Alberto Giani, former Transboundary Environmental Project' team leader and staff of Terra-Nuova at the Nairobi and Garissa offices for their help in logistics, planning of field work and many other ways during the field periods. This document has been produced with the financial assistance of the European Union, through Terra Nuova's Transboundary Environmental Project (TEP). The contents of this document are the sole responsibility of Terra Nuova and National Museum of Kenya and can under no circumstances be regarded as reflecting the position of the European Union.

References

Bennun, L. & Njoroge, P. (eds) 1996. Birds to watch in East Africa: A preliminary Red Data list. *Research Reports of the centre for Biodiversity, National Museums of Kenya: Ornithology* 23.

Bennun, L. & Njoroge, P. 1999. *Important Bird Areas in Kenya*. Nairobi: East Africa Natural History Society.

Bennun, L., Njoroge, P. & Pomeroy, D. 2000. Birds to watch: a Red Data List for East Africa. *Ostrich* 71: 310-314.

del Hoyo, J., Elliot, A. & Sargatal, J. (eds) 1992. *Handbook of the Birds of the world.* Vol.1. Barcelona: Lynx Edicions.

Fanshawe, J.H. 1995. *The effects of selective logging on the bird community of Arabuko-Sokoke Forest.* Unpublished PhD thesis. University of Oxford.

Fishpool, L. 1996. *Important Bird Areas in Africa: IBA criteria, categories and thresholds.* Cambridge: BirdLife International.

IUCN 2008. 2008 IUCN Red List of Threatened Species. <www.iucnredlist.org>. Downloaded on 27 October 2008.

Lewis, A. & Pomeroy, D. 1989. *A bird atlas of Kenya.* Rotterdam: AA Balkema.

OS-c 1996. *Check-list of the birds of Kenya.* Third Edition. Nairobi: East Africa Natural History Society Ornithological Sub-committee.

Stattersfield, A.J., Crosby, M.J., Long, A.J., & Wege, D.C. 1998. *Endemic bird areas of the world: priorities for biodiversity and conservation.* Cambridge: BirdLife International (BirdLife Conservation Series 7).

TEP. 2004. *Procedures and protocols for ecological data collection.* Nairobi: Terra Nuova and Istituto Oikos, Transboundary Environmental Project.

Zimmerman, D.A., Turner, D.A. & Pearson, D.J. 1996. *Birds of Kenya and northern Tanzania.* South Africa: Russell Friedman.

Peter Njoroge*, Muchai Muchane, Wanyoike Wamiti, Dominic Kimani Kamau and Mwangi Githiru

Department of Zoology, National Museums of Kenya, P.O. Box 40658-00100, Nairobi
**E-mail for correspondence: pnjoroge@museums.or.ke*

Scopus 28: 15-24, December 2008
Received February 2008

Appendix

List of all species recorded at Ishaqbini Community Conservancy during the survey, their status (am=afrotropical migrant, pm=palaearctic migrant, R-VU= regionally vulnerable, R-NT= regionally near-threatened, R-RR=regional responsibility, new QSD= new record for quarter degree square 79c, X = considered rare by OS-c 1996) and sampling method that recorded the species (1=mist-netting, 2=point counts, 3= timed species counts, 4=opportunistic observations).

Common Name	Scientific name	Status	1	2	3	4
Somali Ostrich	*Struthio camelus molybdophanes*	R-NT			✓	
Great White Pelican	*Pelecanus onocrotalus*	R-RR, new QSD			✓	
Great Cormorant	*Phalacrocorax carbo*	R-RR				✓
Long-tailed Cormorant	*Phalacrocorax africanus*					✓
Black-crowned Night Heron	*Nycticorax nycticorax*	am, pm				✓
Cattle Egret	*Bubulcus ibis*	am		✓	✓	
Little Egret	*Egretta garzetta*				✓	
Green-backed Heron	*Butorides striatus*	R-NT			✓	
Grey Heron	*Ardea cinerea*	am, pm, R-NT			✓	
Purple Heron	*Ardea purpurea*	R-NT			✓	
Goliath Heron	*Ardea goliath*	R-NT			✓	
Black-headed Heron	*Ardea melanocephala*			✓	✓	
Hamerkop	*Scopus umbretta*			✓	✓	
Woolly-necked Stork	*Ciconia episcopus*	R-NT				✓
Saddle-billed Stork	*Ephippiorhynchus senegalensis*	R-VU				✓
Marabou Stork	*Leptoptilos crumeniferus*					✓
African Open-billed Stork	*Anastomus lamelligerus*			✓	✓	
Yellow-billed Stork	*Mycteria ibis*			✓	✓	
Sacred Ibis	*Threskiornis aethiopicus*			✓	✓	
Hadada Ibis	*Bostrychia hagedash*			✓	✓	
Glossy Ibis	*Plegadis falcinellus*	am, pm			✓	
African Spoonbill	*Platalea alba*					✓
Fulvous Whistling Duck	*Dendrocygna bicolor*					✓
Egyptian Goose	*Alopochen aegyptiacus*					✓
Knob-billed Duck	*Sarkidiornis melanotos*	am			✓	
Secretary Bird	*Sagittarius serpentarius*					✓
Black-shouldered Kite	*Elanus caeruleus*			✓	✓	
Black-chested Snake Eagle	*Circaetus pectoralis*					✓
Bateleur	*Terathopius ecaudatus*			✓	✓	
Eurasian Marsh Harrier	*Circus aeruginosus*	pm				✓
Gabar Goshawk	*Micronisus gabar*				✓	
Eastern Pale Chanting Goshawk	*Melierax poliopterus*				✓	
Little Sparrowhawk	*Accipiter minullus*	X				✓
African Fish Eagle	*Haliaeetus vocifer*			✓		
Pygmy Falcon	*Polihierax semitorquatus*					✓
Harlequin Quail	*Corturnix delegorguei*	new QSD				✓

Common Name	Scientific name	Status	1	2	3	4
Crested Francolin	*Francolinus sephaena*			✓	✓	
Yellow-necked Spurfowl	*Francolinus leucoscepus*				✓	
Vulturine Guineafowl	*Acryllium vulturinum*			✓	✓	
Black Crake	*Amaurornis flavirostra*	new QSD				✓
White-bellied Bustard	*Eupodotis senegalensis*					✓
Black-bellied Bustard	*Eupodotis melanogaster*	new QSD			✓	
Buff-crested Bustard	*Eupodotis ruficrista*					✓
African Jacana	*Actophilornis africanus*					✓
Eurasian Thick-knee	*Burhinus oedicnemus*	pm, X, new QSD				✓
Water Thick-knee	*Burhinus vermiculatus*				✓	
Spotted Thick-knee	*Burhinus capensis*					✓
Kittlitz's Plover	*Charadrius pecuarius*				✓	
Spur-winged Plover	*Vanellus spinosus*				✓	
Black-headed Plover	*Vanellus tectus*			✓	✓	
Senegal Plover	*Vanellus lugubris*			✓	✓	
Greenshank	*Tringa nebularia*	pm				✓
Wood Sandpiper	*Tringa glareola*	pm			✓	
Common Sandpiper	*Actitis hypoleucos*	pm			✓	
Chestnut-bellied Sandgrouse	*Pterocles exustus*	new QSD			✓	
Black-faced Sandgrouse	*Pterocles decoratus*			✓	✓	
African Green Pigeon	*Treron calva*			✓	✓	
Tambourine Dove	*Turtur tympanistria*		✓	✓	✓	
Emerald-spotted Wood Dove	*Turtur chalcospilos*		✓	✓	✓	
Namaqua Dove	*Oena capensis*				✓	
Red-eyed Dove	*Streptopelia semitorquata*			✓	✓	
African Mourning Dove	*Streptopelia decipiens*			✓	✓	
Ring-necked Dove	*Streptopelia capicola*		✓	✓	✓	
Laughing Dove	*Streptopelia senegalensis*			✓	✓	
Fischer's Turaco	*Tauraco fischeri*					✓
Eurasian Cuckoo	*Cuculus canorus*	pm, X, new QSD			✓	
Klaas's Cuckoo	*Chrysococcyx klaas*			✓		
Diederik Cuckoo	*Chrysococcyx caprius*				✓	
White-browed Coucal	*Centropus superciliosus*			✓	✓	
African Scops Owl	*Otus senegalensis*					✓
Donaldson-Smith's Nightjar	*Caprimulgus pectoralis*					✓
Gabon Nightjar	*Caprimulqus fossii*	X, new QSD		✓	✓	
Slender-tailed Nightjar	*Caprimulqus clarus*					✓
African Palm Swift	*Cypsiurus parvus*			✓	✓	
Speckled Mousebird	*Colius striatus*		✓	✓	✓	
White-headed Mousebird	*Colius leucocephalus*		✓			
Blue-naped Mousebird	*Urocolius macrourus*			✓	✓	
Grey-headed Kingfisher	*Halcyon leucocephala*			✓	✓	
Brown-hooded Kingfisher	*Halcyon albiventris*		✓	✓		
Mangrove Kingfisher	*Halcyon senegaloides*		✓		✓	

Common Name	Scientific name	Status	1	2	3	4
Striped Kingfisher	*Halcyon chelicuti*		✓	✓	✓	
Malachite Kingfisher	*Alcedo cristata*					✓
African Pygmy Kingfisher	*Ispidina picta*		✓	✓		
Pied Kingfisher	*Ceryle rudis*					✓
Carmine Bee-eater	*Merops nubicus*	am		✓	✓	
White-throated Bee-eater	*Merops albicollis*	am	✓	✓	✓	
Eurasian Roller	*Coracias garrulus*					✓
Lilac-breasted Roller	*Coracias caudata*			✓	✓	
Green Woodhoopoe	*Phoeniculus purpureus*			✓		
Common Scimitarbill	*Rhinopomastus cyanomelas*			✓		
Abyssinian Scimitarbill	*Rhinopomastus minor*		✓		✓	
Red-billed Hornbill	*Tockus erythrorhynchus*				✓	
Von Der Decken's Hornbill	*Tockus deckeni*		✓	✓	✓	
Crowned Hornbill	*Tockus alboterminatus*			✓	✓	
African Grey Hornbill	*Tockus nasutus*			✓	✓	
Trumpeter Hornbill	*Bycanistes bucinator*			✓		
Red-fronted Tinkerbird	*Pogoniulus pusillus*		✓	✓	✓	
Brown-breasted Barbet	*Lybius melanopterus*					✓
d'Arnaud's Barbet	*Trachylaemus darnaudii*		✓	✓	✓	
Scaly-throated Honeyguide	*Indicator variegatus*		✓	✓	✓	
Greater Honeyguide	*Indicator indicator*		✓	✓		
Nubian Woodpecker	*Campethera nubica*		✓			
Mombasa Woodpecker	*Campethera mombassica*	R-RR		✓		
Green-backed Woodpecker	*Campethera cailliautii*		✓		✓	
Red-winged Lark	*Mirafra hypermetra*					✓
Pink-breasted Lark	*Mirafra poecilosterna*	R-RR			✓	
Wire-tailed Swallow	*Hirundo smithii*					✓
Barn Swallow	*Hirundo rustica*	pm				✓
Golden Pipit	*Tmetothylacus tenellus*					✓
African Pied Wagtail	*Motacilla aguimp*					✓
Yellow Wagtail	*Motacilla flava*	pm			✓	
Grassland Pipit	*Anthus cinnamomeus*					
Zanzibar Sombre Greenbul	*Andropadus importunus*		✓	✓	✓	
Northern Brownbul	*Phyllastrephus strepitans*		✓	✓		
Common Bulbul	*Pycnonotus barbatus*		✓	✓	✓	
Rufous Chatterer	*Turdoides rubiginosus*		✓	✓	✓	
White-browed Robin Chat	*Cossypha heuglini*					✓
White-browed Scrub Robin	*Cercotrichas leucophrys*		✓	✓	✓	
Eastern Bearded Scrub Robin	*Cercotrichas quadrivirgata*		✓	✓	✓	
Rufous Bush Chat	*Cercotrichas galactotes*	pm	✓		✓	
Northern Wheatear	*Oenanthe oenanthe*	new QSD			✓	
Spotted Flycatcher	*Muscicapa striata*	pm		✓		
Southern Black Flycatcher	*Melaenornis pammelaina*					✓
African Grey Flycatcher	*Bradornis microrhynchus*				✓	

Common Name	Scientific name	Status	1	2	3	4
Pale Flycatcher	*Bradornis pallidus*			▯		
Barred Warbler	*Sylvia nisoria*	pm, X, new QSD	▯		▯	
Common Whitethroat	*Sylvia communis*	Pm, new QSD	▯			
Willow Warbler	*Phylloscopus trochilus*	pm		▯		
Winding Cisticola	*Cisticola galactotes*					▯
Rattling Cisticola	*Cisticola chiniana*			▯		
Ashy Cisticola	*Cisticola cinereolus*	new QSD				▯
Pale Prinia	*Prinia somalica*				▯	
Grey Wren Warbler	*Calamonastes simplex*		▯	▯	▯	
Grey-backed Camaroptera	*Camaroptera brachyura*		▯	▯	▯	
Northern Crombec	*Sylvietta brachyura*		▯	▯	▯	
Red-faced Crombec	*Sylvietta whytii*	new QSD			▯	
Somali Long-billed Crombec	*Sylvietta isabellina*	new QSD				▯
Yellow-vented Eremomela	*Eremomela flavicrissalis*	new QSD			▯	
Pygmy Batis	*Batis perkeo*	new QSD				▯
Northern White-crowned Shrike	*Eurocephalus rueppelli*		▯	▯	▯	
Red-tailed Shrike	*Lanius isabellinus*	pm			▯	
Long-tailed Fiscal	*Lanius cabanisi*	R-RR				▯
Taita Fiscal	*Lanius dorsalis*				▯	
Black-crowned Tchagra	*Tchagra senegala*		▯	▯	▯	
Sulphur-breasted Bush-Shrike	*Malaconotus sulfureopectus*			▯		
Grey-headed Bush-Shrike	*Malaconotus blanchoti*			▯		
Tropical Boubou	*Laniarius aethiopicus*		▯	▯		
Slate-coloured Boubou	*Laniarius funebris*	new QSD		▯	▯	
Black-backed Puffback	*Dryoscopus cubla*		▯	▯		
Black Cuckoo Shrike	*Campephaga flava*			▯		
Common Drongo	*Dicrurus adsimilis*		▯	▯	▯	
Eurasian Golden Oriole	*Oriolus oriolus*	pm			▯	
Black-headed Oriole	*Oriolus larvatus*		▯	▯	▯	
Black-bellied Starling	*Lamprotornis corruscus*			▯	▯	
Greater Blue-eared Starling	*Lamprotornis chalybaeus*	new QSD		▯		
Rüppell's Long-tailed Starling	*Lamprotornis purpuropterus*		▯	▯	▯	
Superb Starling	*Lamprotornis superbus*			▯	▯	
Fischer's Starling	*Spreo fischeri*		▯	▯		
Wattled Starling	*Creatophora cinerea*			▯		
Eastern Violet-backed Sunbird	*Anthreptes orientalis*		▯	▯	▯	
Collared Sunbird	*Anthreptes collaris*		▯	▯	▯	
Mouse-coloured Sunbird	*Nectarinia veroxii*		▯			
Olive Sunbird	*Nectarinia olivacea*		▯	▯		
Amethyst Sunbird	*Nectarinia amethystina*			▯	▯	
Hunter's Sunbird	*Nectarinia hunteri*					▯
Variable Sunbird	*Nectarinia venusta*			▯		
Purple-banded Sunbird	*Nectarinia bifasciata*		▯	▯	▯	
Violet-breasted Sunbird	*Nectarinia chalcomelas*	X	▯	▯	▯	

Common Name	Scientific name	Status	1	2	3	4
House Sparrow	*Passer domesticus*	new QSD				✓
Yellow-spotted Petronia	*Petronia pyrgita*			✓	✓	
White-headed Buffalo-Weaver	*Dinemellia dinemelli*		✓	✓	✓	
Red-billed Buffalo-Weaver	*Bubalornis niger*		✓	✓	✓	
Black-necked Weaver	*Ploceus nigricollis*		✓		✓	
Spectacled Weaver	*Ploceus ocularis*				✓	
African Golden Weaver	*Ploceus subaureus*				✓	
Vitelline Masked Weaver	*Ploceus velatus*				✓	
Lesser Masked Weaver	*Plocepasser itermedius*					✓
Black-headed Weaver	*Ploceus cucullatus*					✓
Chestnut Weaver	*Ploceus rubiginosus*			✓		
Red-billed Quelea	*Quelea quelea*	am				✓
Green-winged Pytilia	*Pytilia melba*		✓			
Common Waxbill	*Estrilda astrild*			✓		
Red-cheeked Cordon-bleu	*Uraeginthus bengalus*					✓
Bronze Mannikin	*Lonchura cucullata*			✓		

Scopus 28: 25-30, December 2008

Some conservation aspects of papyrus endemic passerines around Lake Victoria, Kenya

Alfred O. Owino and Joseph O. Oyugi

The conservation of papyrus *Cyperus papyrus* swamps is a neglected issue in Kenya. These swamps occur in patches. Whilst the best patches of intact habitat still occur in the Lake Victoria basin (where they previously formed a continuous fringe along the shoreline), this landscape has been severely disrupted and fragmented in recent years (Kairu 2001, Byaruhanga *et al*. 2001). Extensive, intact patches of papyrus today only occur at the mouths of the major rivers and associated small lakes (Bennun & Njoroge 1999). Papyrus swamps, like many other wetlands, have very important hydrological, ecological and economic functions, but their avifauna is not particularly rich compared to other habitats. Nonetheless, the papyrus avifauna includes an impressive number of specialists including Papyrus Gonolek *Laniarius mufumbiri*, which belongs to the bush-shrikes (Malaconotidae), Carruthers' Cisticola *Cisticola carruthersi* (member of widespread genus Cisticola), White-winged Warbler *Bradypterus carpalis*, Greater Swamp Warbler *Acrocephalus rufescens*, Papyrus Yellow Warbler *Chloropeta gracilirostris* among others (Leisler & Winkler 2001). Papyrus Yellow Warbler, the globally Near-threatened Papyrus Gonolek and several other species are of regional significance (BirdLife International 2004, Bennun & Njoroge 1996). The papyrus swamps in the Lake Victoria basin are therefore of great significance, not only for conservation of these passerines but also to other fauna.

Generally, the papyrus-endemic birds are poorly studied and very little is known about their biology (Fanshawe & Bennun 1991). Previous surveys by Maclean *et al*. (2003) have shown that papyrus-specialist bird species are not evenly distributed in the Kenyan sector of Lake Victoria. Various studies have documented the effects of particular disturbance agents on papyrus specialist birds and found fewer specialist birds in disturbed papyrus stands. For instance, Papyrus Yellow Warbler is absent from the more extensive papyrus stands around the northern and western shores of Lake Victoria (BirdLife International 2004). This lack of adequate knowledge is a concern, since the habitats they depend on are under severe anthropogenic pressures. Furthermore, insufficient information hinders our ability to distinguish which papyrus swamp fragments in the Kenyan sector of Lake Victoria are of priority concern for conservation action, based on the levels of threats and the species present.

This study had three key objectives; (i) to assess the status and distribution of papyrus endemic birds in relation to papyrus habitat conditions; (ii) using standardized point counts, estimate their population sizes; and (iii) undertake general assessment of qualities of papyrus fragments with respect to the long-term survival of the species.

Study areas and methods

The three papyrus swamps, Dunga (01°10′S, 34°47′E), Koguta (01°17′S, 34°36′E) and Kusa (01°19′S, 34°51′E) (Figure 1) located in western Kenya were surveyed. All three swamps are listed as Important Bird Areas (Bennun & Njoroge 1999). The swamps are quite diverse in aquatic plants whose abundance and distribution differ considerably (Gichuki *et al.* 2001). Koguta and Kusa are probably important refugia for Lake Victoria's *haplochromine* fish species. Dunga lies 10 km south of Kisumu town, extending southeast along the lakeshore for about 5 km, but varying in width between 50 and 800 m (Bennun & Njoroge 1999). It has considerable ecotourism potential, especially for bird-watching. Nevertheless, its proximity to Kisumu exposes it to high levels of pollution in the form of sewage and solid wastes. Koguta, 30 km southwest of Kisumu is flooded during the rainy season and heavily grazed during the dry season. Kusa occurs at the eastern-most end of Winam Gulf of Lake Victoria, and is close to a major fish landing beach and human settlements.

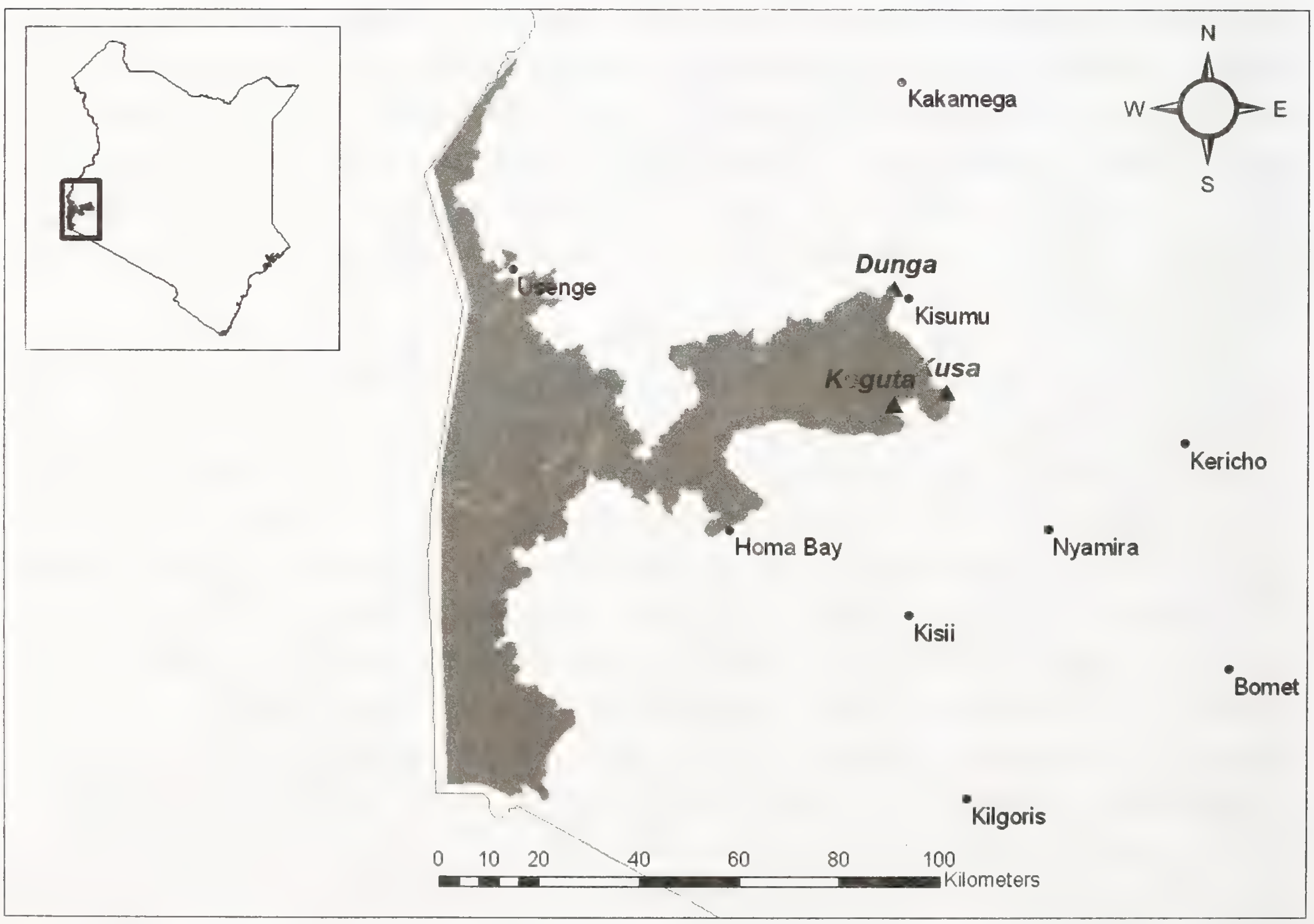


Figure 1. Location of study sites in the Kenyan sector of Lake Victoria.

The study was conducted between June and August 2007. Papyrus endemic birds together with other papyrus-associated species were surveyed at the three sites using fixed-radius point counts and playback calls (Bibby *et al.* 2000). Using sketch maps developed from the most recent aerial photographs, sample stations were selected on lakeward and landward sections of the three sites; landward stations were accessed on foot and lakeward by boat. Twenty randomly selected points (10 each on the lakeward and landward sections), spaced at least 250 m apart and at least 20 m from the edge, were sampled in each of the three study sites. These sampling stations were visited during morning hours (between 06:00 and 11:00); a settling-down period of two-three minutes was allowed before sampling begun. A fixed radius of 40 m was used as standard radius; birds detected beyond this distance or that were flying over the point were not included in these analyses. An initial 10-minute interval was used to detect and count individual birds. This was followed by playback calls for individual papyrus endemic species lasting for an average 15-20 seconds at intervals of 10 seconds to elicit response of more secretive individuals; no counting was done during the playback sessions which were chiefly meant to check for presence of the papyrus endemic birds.

The assessment of habitat conditions for each site involved evaluation of physical characteristics of papyrus and levels of human disturbance. These parameters were visually estimated at all bird survey stations. Assessment of habitat structure was based on papyrus heights and densities. Other plant species at the sampling points were noted. The assessment of papyrus degradation focused on five disturbance agents of: burning, papyrus cutting, livestock grazing, footpaths/trampling, and farming/drainage. These five factors are thought to directly affect papyrus habitat conditions at the three sites (Bennun & Njoroge 1999). Five quadrats measuring approximately 10 x 10 m around each station were assessed for all the habitat variables considered. Papyrus heights were estimated to the nearest 1 m from 0–3 m and percentage cover estimated to the nearest 5%. Counts of individual papyrus endemic birds were used as a response variable in a simple regression with the variables related to papyrus physical structure (papyrus height, density, and disturbance parameters) as the explanatory variables.

Results and Discussion

Playbacks and observations confirmed the presence of five papyrus specialist birds at the three sites, but the numbers were generally low. Overall, White-winged Warbler (n = 98) and Papyrus Gonolek (n = 96) were the most common across the sites, while Papyrus Yellow Warbler was the least common (Table 1). Notably, the Papyrus Canary was not recorded at any of these sites. This was surprising, and could suggest that this species is more sensitive to papyrus disturbance compared to other endemic birds, but this requires more detailed investigation. Generally, the population sizes of the papyrus endemic birds were higher in relatively undisturbed habitats compared to the degraded

habitats. Nevertheless, the five endemics recorded across sites appeared tolerant of low-intensity disturbance, occurring frequently in sections of the swamps that were subject to low-intensity clearance and harvesting. Further, small isolated fragments (< 1 ha) had no papyrus endemic birds, which were present in small fragments that were close to larger ones. This was possibly due to inter-patch movements, especially for Carruthers' Cisticola and Papyrus Gonolek.

Table 1. Numbers of individual endemic birds counted at Dunga, Koguta and Kusa swamps in the Kenyan sector of Lake Victoria.

Species	Dunga	Koguta	Kusa	Total
White-winged Warbler	49	27	22	98
Papyrus Gonolek	59	27	10	96
Greater Swamp Warbler	44	20	10	74
Carruthers's Cisticola	27	19	24	70
Papyrus Yellow Warbler	2	6	3	11

The relationship between numbers of papyrus endemics and papyrus habitat structure indicated that papyrus height was the most important factor in predicting the abundance of birds recorded at each sites. There were highly significant relationships between mean papyrus height and numbers of both the Papyrus Gonolek (R^2 = 0.96, P = 0.001) and White-winged Warbler (R^2 = 0.91, P = 0.02) (Figure 2a & b, respectively). The other three papyrus endemics exhibited weaker, non-significant relationships with mean papyrus heights.

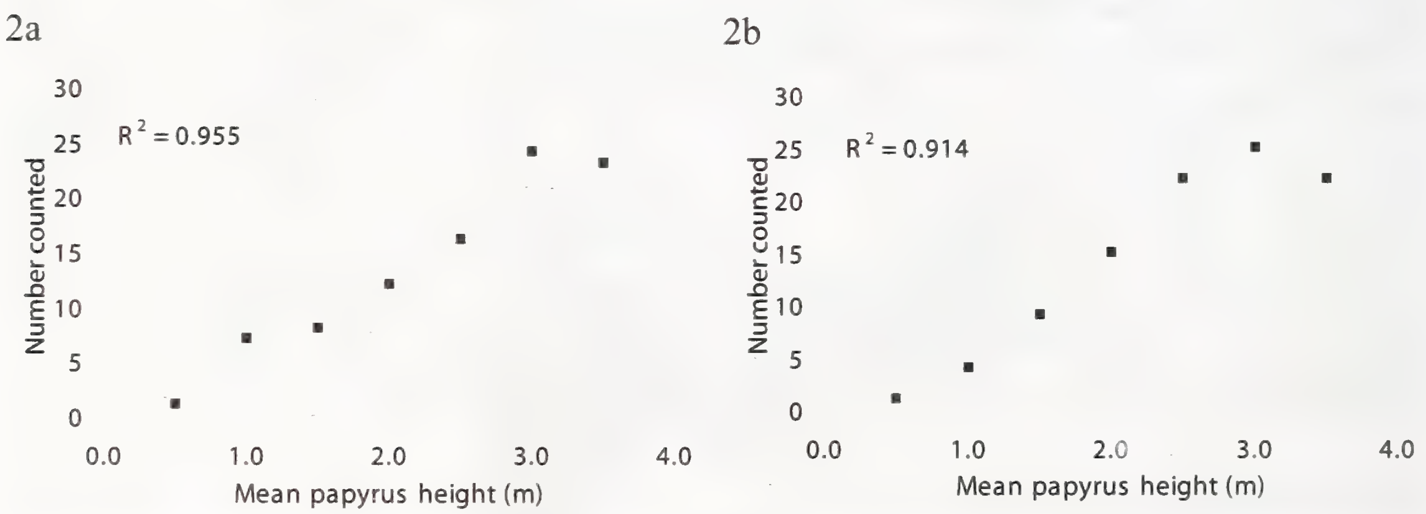


Figure 2. Regression analyses of numbers of Papyrus Gonolek (2a) and White-winged Warbler (2b) against mean papyrus height (m) at Dunga, Kusa and Koguta combined in the Kenyan sector of Lake Victoria.

Playback and intensive searches revealed that smaller fragments situated near the main stands still retain some papyrus endemics. Birds probably moved between these smaller fragments from the main stands, indicating that fragmentation and increasing isolation could deter dispersal in these papyrus endemic species. Thus, as the fragmentation continues with widening gaps

between the fragments, there is likelihood that such movements will be curtailed resulting in isolated populations.

Ecological studies of papyrus have quantified the incredible powers of this plant to grow or recover from destruction (Boar *et al.* 1999). Indeed, observations from previous studies have demonstrated that a clear-cut patch of papyrus could be sufficiently restored in 10 weeks (Thompson *et al.* 1979). However, frequent and repeated harvesting of papyrus is known to reduce its productivity and resilience (Muthuri *et al.* 1989). This can have adverse impacts on papyrus endemic species. Destruction of papyrus swamps for development is a growing environmental problem in the Kenyan sector of Lake Victoria, such that papyrus-dependent biodiversity appears to be in real danger of extirpation. Moreover, the local people continuously harvest papyrus for various socio-economic reasons. Given the high human population growth rates in the region, future demands for papyrus products are set to increase, which is bound to have negative impacts on papyrus endemic bird species as well as other papyrus-associated biodiversity (Owino & Ryan 2007).

In summary, it is important that appropriate conservation measures are undertaken to ensure that sustainable use options are adopted in these three sites. Environmentally-friendly activities such as eco-tourism and bird-watching should be encouraged in the region as a way of boosting the income levels of the local people. This will enable the local people to look at papyrus swamps as important resources that should be conserved in their natural form, and not necessarily resources through exploitation. In addition, our findings suggest that the four key papyrus swamps in the Kenyan sector of Lake Victoria that are presently only listed as Important Bird Areas possibly warrant upgrading to protected areas based on the biota they support as well as current threats. Lastly, it is vital to study and monitor the effects of various papyrus harvesting regimes on particular papyrus endemic species. This would be important in developing appropriate papyrus harvesting guidelines without compromising the conservation of these species.

Acknowledgements

This study received financial support from British Ornithologists' Union with additional support from Kenya Wildlife Service. The study received logistical support from the Lake Victoria Sunset Birders and Wildlife Clubs of Kenya (Western Region). The hard work by Evarastus Obura, Alai Orimba and Mike Warioba of Lake Victoria Sunset Birders ensured successful fieldwork. We are grateful for helpful comments from Woody Cotterill on an earlier version of this manuscript.

References

Bennun, L. & Njoroge, P. 1996. Birds to watch in East Africa: A preliminary Red Data list. *Research Reports of the Centre for Biodiversity, National Museums of Kenya: Ornithology* 23.

Bennun, L.A. & Njoroge, P. 1999. *Important bird areas in Kenya.* Nairobi, Kenya: East Africa Natural History Society.

Bibby, C.J., Burgess, N.D. & Hill, D.A. 2000. *Bird census techniques*. London, UK: Academic Press.

BirdLife International 2004. *Threatened birds of the world*. Cambridge, UK: BirdLife International.

Boar, R.R., Harper, D.M. & Adams, C.S. 1999. Biomass allocation in *Cyperus papyrus* in a tropical wetland, Lake Naivasha, Kenya. *Biotropica* 31: 411-421.

Byaruhanga, A., Kasoma, P. & Pomeroy, D. 2001. *Important bird areas in Uganda*. Kampala, Uganda: East Africa Natural History Society.

Fanshawe, J.F. & Bennun, L.A. 1991. Bird conservation in Kenya: creating a national strategy. *Bird Conservation International* 1: 293-315.

Gichuki, J., Guebas, F.D., Mugo, J., Rabuor, C.O., Triest, L. & Dehairs, F. 2001. Species inventory and the local uses of the plants and fishes of the Lower Sondu Miriu wetland of Lake Victoria, Kenya. *Hydrobiologia* 458: 99-106.

Kairu, J.K. 2001. Wetland use and impact on Lake Victoria, Kenya region. *Lakes Resources and Management* 6: 117-125.

Leisler, B. & Winkler, H. 2001. Morphological convergence in papyrus dwelling passerines. *Ostrich* 15: 24-29.

Maclean, I.M.D., Hassall, M., Boar, R. & Nasirwa, O. 2003. Effects of habitat degradation on avian guilds in East African papyrus *Cyperus papyrus* swamps. *Bird Conservation International* 13: 283-297.

Muthuri, F.M., Jones, M.B. & Mimbamba, S.K. 1989. Primary productivity of papyrus cyperus papyus in a tropical swamp, Lake Naivasha, Kenya. *Biomass* 18: 1-14.

Owino, A.O. & Ryan, P.G. 2007. Recent papyrus habitat loss and conservation implications in western Kenya. *Wetlands Ecology and Management* 15: 1-12.

Thompson, K., Shewry, P.R. & Woolhouse, H.W. 1979. Papyrus development in the Upemba Basin, Zaire: population structure in *Cyperus papyrus* stands. *Botanical Journal of the Linnaean Society* 78: 299-316.

Alfred O. Owino
Biodiversity Research & Monitoring Division, Kenya Wildlife Service, P.O. Box 40241-00100, Nairobi, Kenya. E-mail for correspondence: Alfred@kws.go.ke
Joseph O. Oyugi
Biology Department, Wright College 4300 N. Narragansett, Chicago, Il 60634, USA.
E-mail: joyugi@ccc.edu

Scopus 28: 25-30, December 2008
Received March 2008

Scopus 28: 31-36, December 2008

Field notes of raptors in and around Mertule Mariam, Gojjam Province, northwest Ethiopia

Joel Prashant Jack and Ashenafi Degefe

In recent years much emphasis has been given to the conservation of raptors especially as a result of widespread population declines reported both regionally and globally (e.g., Thiollay 2006a, b), resulting in the upgrading of the conservation status for several raptors, especially vultures (IUCN 2008). Raptors are perceived to be at a higher risk because of their typically low productivity rates (Bennett & Owens 1997). Loss of habitat and climate change (rise in temperatures at poles) could have some effect on the population sizes and population re-distribution of African and Eurasian Raptors. Habitat modification by man and resultant destruction of breeding sites remains one of the greatest threats for many raptor species.

Mertule Mariam is approximately located between 10°42′ and 10°45′N and 37°51′E in Gojjam province of northwest Ethiopia, situated at an altitude of 2500 m a.s.l. and close to the Choke Mountains IBA (ET013) (EWNHS 1996, BI 2008). Geographically, it occurs on the western fringes of the Choke Mountains range, the closest point being Motta, about 40 km away from Mertule Mariam town. It is generally a mountainous area, with the terrain consisting of cliffs, gorges, undulating slopes, patches of woodland and lowland plateau. Many small streams originate in the mountains. The most remarkable feature of these mountains is the virtual absence of native forest. The major natural habitats are moist moorland with giant *Lobelia* spp., *Alchemilla* spp., sedges and tussocks of *Festuca* spp. and other grasses, montane grasslands and meadows, cliffs and rocky areas (BI 2008). Woody plants, *Erica* spp., *Hypericum revolutum* and *Arundinaria alpina* are also found in patches. Agricultural activity is extensive, with cultivation up to 3000 m (BI 2008). This paper provides notes of raptors seen during a survey of one of the remote areas of Mertule Mariam.

Study Sites

Raptor surveys were conducted at the following three sites within Mertule Mariam:

Site 1: Mertule Mariam Agricultural Technical Vocational Education Training College (ATVET): This College is located in a highland area of Mertule Mariam. The ATVET campus is built in 50 ha of area dominated by *Eucalyptus, Cupressus lusitanica, Grevillea robusta, Dovyalis* species and several *Acacia* species. A massive plantation of *Cupressus lusitanica* inside

the campus provides potential perch for raptor species as well as other birds.

Site 2: Synapose Village: This village is located about 5 km south of ATVET campus. The area between the two sites is dominated by fields and also small hillocks. *Erica arborea, Grevillea robusta, Dovyalis, Olea* species and *Cupressus lusitanica* dominate the flora. Emergent *Eucalyptus* at the foothills of the mountain provide potential vantage sites for raptors.

Site 3: Shrimbrima monastery: This monastery is situated about 20 km north of ATVET at the foot of the valley. The area is dominated by thick patches of vegetation with numerous streams flowing into it. Both broad-leaved and needle-type trees occur in this area. *Olea* species, *Hagenia abyssinica, Cordia Africana, Embelia schimpera, Cupressus lusitanica* dominate the valley wooded belt providing potential habitat for many raptors and woodland birds.

Methods

Bi-weekly surveys were carried out at all three sites between December 2001 and April 2002. There were a total of 42 survey-days, and 252 man-hours at an average of 75 man-hours per site. Surveys involved random walks along specified road or tracks within each site; perch sites were noted where applicable. Observations were carried out only during the day, between 06:00 and 12:00 on the first day, and from 12:00 to 18:30 on the following day. This was deemed sufficient to capture all the diurnal variability in behaviour of the raptors, so as not to miss out any species or important aspects of any of the species.

Results

We recorded 16 raptor species during our surveys; numbers were generally low with only few individuals seen for most species. Highlights for each of these species are provided below, together with their current taxonomy and status following IUCN (2008).

Black-shouldered Kite *Elanus axillaris*

Least Concern: this was one of the local species in this region and it was encountered during all visits. It was most common in the ATVET college campus, perhaps because of numerous perch sites and grasslands, the latter that enabled it locate prey species in the surrounding open grassland.

Yellow-billed Kite *Milvus migrans parasitus*

Least Concern: An Afrotropical migrant that breeds throughout Ethiopia. It was widespread and common. A breeding site has been recorded within the vicinity of Mertule Mariam church. Groups of *c*100 plus birds were recorded in these survey sites especially around a slaughter site at ATVET campus.

Egyptian Vulture *Neophron percnopterus*

Endangered: This species is resident in Ethiopia but also a Eurasian migrant. A total of six birds were recorded during the study period, usually seen soaring near the cliff at Shrimbrima monastery or gliding low over ATVET campus.

Lammergeier *Gypaetus barbatus*

Least Concern: This species is considered widespread and common in the Ethiopian Rift Valley (EWNHS 1996), but only two birds were observed at Mertule Mariam during our survey.

Hooded Vulture *Necrosyrtes monachus*

Least Concern: Was one of the most common vultures in the Mertule Mariam highlands. During slaughter days at ATVET campus (twice a week) these birds would congregate in big numbers in nearby trees; about 57 individuals were seen on 16th March 2002.

African White-backed Vulture *Gyps africanus*

Near Threatened: **Considered** a common species in Ethiopia, a group of 43 individuals was recorded south of ATVET campus near Synapose village feeding on a donkey carcass.

Rüeppell's Griffon *Gyps rueppellii*

Near Threatened: Regularly recorded throughout Ethiopia. A total of 17 individuals were recorded during the study period mostly on open land around south of ATVET campus and Synapose village, either at a carcass or soaring.

White-headed Vulture *Trigonoceps occipitalis*

Vulnerable: A total of six birds were seen during the study period, at the slaughter site of Synapose village.

African Harrier Hawk *Polyboroides typus*

Least Concern: Resident breeder in this area, a solitary individual was sighted twice during this survey in ATVET campus on a *Cassia* species.

Pallid Harrier *Circus macrourus*

Near Threatened: A total of four birds were recorded during this survey at a local millet field near Synapose village gliding over the fields.

Ovampo Sparrowhawk *Accipiter ovampensis*

Least concern: A solitary bird was recorded on 13th January 2002 east of Synapose village, near local millet field bordering small patch of woodland.

Augur Buzzard *Buteo augur*

Least concern: A common bird throughout most of Ethiopia, a total of 11 individuals were recorded during the study period, mostly on the way to Shrimbrima monastery either perching or soaring.

Tawny Eagle *Aquila rapax*

Least concern: This species was regularly sighted near Shrimbrima monastery either soaring or perched on tall Eucalyptus trees; five individuals were observed during the study period.

Steppe Eagle *Aquila nipalensis*

Least concern: A Eurasian migrant, this species was uncommon in all study sites; only four individuals were recorded during the study period, mostly north of ATVET campus at the Shrimbrima monastery.

Long-crested Eagle *Lophaetus occipitalis*

Least concern: A solitary bird was sighted on two different occasions in the ATVET campus.

Lesser Kestrel *Falco naumanni*

Vulnerable: A relatively common bird in Ethiopia, a pair was recorded in Synapose village near a millet field on two different occasions. It is noteworthy that a flock of 32 individuals was recorded 30 km north of Mertule Mariam but slightly outside of our three survey sites.

Discussion

Even though 16 species of raptors were recorded during the study period, numbers were found to be generally low. This might be due to limited prey availability, limited suitable breeding habitats or (direct and indirect) persecution. Indeed, it has been reported recently that use of pesticides and diclofenac drugs on livestock has precipitated drastic declines in vulture numbers in South Asia (e.g., Green *et al.* 2004).

Large areas within Mertule Mariam are threatened by destruction of the woody vegetation through intense woodcutting (for firewood and charcoal) and agriculture. This has led to the disappearance of suitable habitat - the optimal wooded grasslands, and is likely to have adverse ramifications on medium and small sized birds of prey such as *Aquila*, *Buteo* and *Accipiter* species. In Eastern Africa, migrants and resident raptors largely depend on grasslands and open woodlands habitats for their survival. These habitats play a key role in supporting many Eurasian, Palaearctic and Afrotropical migrant raptors during their migration through East Africa (Brown 1971, Brown *et al.* 1982). Indeed, Bildstein and colleagues (2000) reported that a principal threat to African migrant raptors is the loss of grasslands and savannah.

Another factor worth keeping in mind apart from direct habitat disturbance is climate change. Raptors are vulnerable to modification in the environment

(Dean & Milton 1988). Wichmann and colleagues (2004) modelled extinction risk of Tawny Eagle in South Africa and predicted that even a slight change in rainfall could have a significant impact. More detailed population size, ecological and behavioural studies are urgently needed for the raptors of Mertule Mariam, which seem to be under immediate threat from human-induced habitat loss and degradation, and also face the looming climate change threat.

Acknowledgements

Our sincere thanks go to Simon Thomsett for his critical analysis and valuable comments on the manuscript. Munir Virani also provided insightful comments that improved this article. The author especially Dr. Joel Prashant Jack is thankful to the Dean, Mr.Dagne Tadesse for his co-operation during my stay. Thanks also go to Teshale Belachew, Tafesse Kibatu, Weldosenbet Gebre and Moges Jembere of the ATVET College.

References

Bennett, P.M. & Owens, I.P.F. 1997. Variation in extinction risk among birds: chance or evolutionary predisposition? *Proceedings of the Royal Society of London B* 264: 401-408.

BI 2008. *BirdLife's online World Bird Database: the site for bird conservation*. Version 2.1. Cambridge, UK: BirdLife International. Available: http://www.birdlife.org (accessed 21/11/2008).

Bildstein, K.L., Zalles, J.A., Ottinger, J. & McCarty, K. 2000. *Conservation biology of the Worlds migratory raptors: status and strategies*. R.D. Chancellor and B.U. Meyburg (Eds.) Raptors at six: Proceedings of the V World Conference on Birds of Prey and Owls. Johannesburg. South Africa.

Brown, L. 1971. *African Birds of Prey*. Houghton Mifflin, Boston, USA.

Brown, L.H, Urban, E.K & Newman, K 1982: *The Birds of Africa* Volume 1. Academic Press, London.

Dean, W.R.J. & Milton, S.J. 1988. Dispersal of seeds by raptors. *African Journal of Ecology* 26: 173-176.

EWNHS 1996. *Important Bird areas of Ethiopia. A First Inventory*. Ethiopian Wildlife and Natural History Society, Addis Ababa.

Green, R.E., Newton, I., Shultz, S., Cunningham, A.A., Gilbert, M., Pain, D.J., & Prakash, V. 2004. Diclofenac poisoning as a cause of vulture population declines across the Indian subcontinent. *Journal of Applied Ecology* 41: 793-800.

IUCN 2008. 2008 IUCN Red List of threatened species. IUCN: The World Conservation Union. http://www.iucnredlist.org/.

Thiollay, J.M. 2006a. The decline of raptors in West Africa: long-term assessment and the role of protected areas. *Ibis* 148: 240-254.

Thiollay, J.M. 2006b. Severe decline of large birds in the Northern Sahel of West Africa: a long-term assessment. *Bird Conservation International* 16: 353-365.

Wichmann, M.C, Dean, W.R.J. & Jeltsch, F. 2004. Global challenge challenges the Tawny Eagle (*Aquila rapax*): modelling extinction risk with respect to predicted climate and land use changes. *Ostrich* 75: 204-210.

Joel Prashant Jack (Corresponding author)
Department of Environment, Faculty of Public Health, Post Box 18251, Al-Arab Medical University, Benghazi, Libya, E-mail for correspondence: joelprashant@gmail.com
Ashenafi Degefe
Post Box 68, Ministry of Agriculture, Motta, Ethiopia

Scopus 28: 31-36, December 2008
Received February 2008

Short Communications

Fruit-eating at *Celtis gomphophylla* (Ulmaceae) by Banded-green Sunbirds *Anthreptes rubritorques* and other species

Compared to other tropical regions, very few studies with a focus on frugivorous bird guilds foraging at fleshy fruiting trees have been carried out in African forests (e.g., Kirika *et al*. 2008). Such information would significantly improve our understanding of the role of avian frugivory in seed dispersal for African tree species. We present observations on fruit-eating bird species at Amani Nature Reserve, East Usambara Mountains, Tanzania. Thirteen of 22 frugivorous bird species occurring in the submontane region of the study area consumed fleshy fruits of *Celtis gomphophylla* (Ulmaceae). Of particular interest, one sunbird species, a member of a guild chiefly known to feed on nectar and invertebrates (Fry *et al.* 2000), was a frequent fruit-eating visitor at this tree species. This observation highlights the lack of sufficient knowledge about frugivory and seed dispersal of African forest trees by birds.

Celtis gomphophylla is a 15-30 m high tree that is typically found at forest edges, disturbed pockets of forest or large open forest gaps (Schulman *et al.* 1998). Its ripe fruits are yellow spherical drupes 5–8 mm in diameter, with a soft, fleshy pulp surrounding a small, hard seed (mean seed size: 6.4 x 5.2 mm, n = 8). In the study area, trees fruited heavily (> 50,000 fruits per tree) from March to July, which is before and during the long rainy season. In late March 2000, we observed birds feeding on fruits of two individual *Celtis gomphophylla* trees, both with approximately 25% of their fruit crops in the ripe stage. These trees were located at the edge of the extensive forest protected within Amani Nature Reserve. Casual observations were made at these trees in late March, and, two focused watches of 237 and 150 minutes were made on 31 March and 8 April 2000. The goal was to document the frugivore assemblage and assess rates of fruit intake by each species. We observed individual birds for 3-minute intervals, changing to a different bird when the interval was up or when the bird moved out of sight. We enumerated the number of fruits consumed per unit time. An additional opportunistic observation of fruit-eating birds was made at another *C. gomphophylla* tree at the forest edge on 25 July 2001.

Thirteen bird species were observed consuming the ripe fruits of *C. gomphophylla* (Table 1). Green-headed Orioles *Oriolus chlorocephalus,* Black-bellied Starlings *Lamprotornis corruscus*, Stripe-cheeked *Andropadus milanjensis* and Shelley's Greenbuls *A. masukuensis* and Yellow White-eye *Zosterops senegalensis* consumed more fruits per unit time than the other species (Table 1).

Table 1. Rate of *Celtis gomphophylla* fruit intake by birds in the East Usambara Mountains

Species	mean # fruits/ min + SE*	n†	primary habitat**
Green-headed Oriole *Oriolus chlorocephalus*	4 ‡	1	forest interior
Black-bellied Starling *Lamprotornis corruscus*	2.83 + 0.29	4	forest edge, secondary growth
Stripe-cheeked Greenbul *Andropadus milanjensis*	2.68 + 0.78 ‡	6	forest interior
Shelley's Greenbul *A. masukuensis*	2.44 + 0.80	3	forest interior
Yellow White-eye *Zosterops senegalensis*	1.73 + 0.35 ‡	11	forest interior, secondary growth
Common Bulbul *Pycononotus barbatus*	1.5 ‡	1	secondary growth, farmland
Little Greenbul *A. virens*	1.39 + 0.53	3	forest edge, secondary growth
Green Barbet *Stactolaema olivacea*	1.25 + 0.25 ‡	2	forest interior
Moustached Green Tinkerbird *Pogoniulus leucomystax*	1.17 + 0.38 ‡	6	forest interior, secondary growth
Banded-green Sunbird *Anthreptes rubritorques*	0.88 + 0.12 ‡	21	forest edge and interior, farmland
White-eared Barbet *Stactolaema leucotis*	§		secondary growth, forest edge, farmland
Waller's starling *Onychognathus walleri*	‡		forest interior, secondary growth
Kenrick's starling *Poeoptera kenricki*	‡		forest interior, secondary growth

* Rate of fruit intake is the mean number of fruits consumed per minute, pooling data from both tree watches

** Primary habitat is based on observations carried out throughout the study area (NJC, unpublished data)

† n = number of individuals of each bird species for which fruit intake rates were calculated

§ This barbet was not observed consuming fruits during these watches, but was observed doing so on other casual observations at these trees

‡ Species observed feeding on fruits at a different tree at the forest edge on 25 July 2001

Banded-green Sunbirds *Anthreptes rubritorques* consumed the fewest fruits on average, but were far more numerous and regular visitors compared to most of the other species (pers. obs.). In four separate 10-minute bouts of observation at one tree, 16 Banded-green Sunbirds, six Shelley's Greenbuls, six Moustached Green Tinkerbirds *Pogoniulus leucomystax* and 10 Yellow White-eyes were observed, whereas, other species occurred as pairs or singletons. However, it is also likely that the sunbirds were overestimated because individuals remained on the tree for very short periods (< 3-5 minutes), and thus some of the same individuals may have made repeated visits.

Our observations indicate that the fruits of *C. gomphophylla* are consumed by a mix of bird species inhabiting primary and secondary forest, edge

growth and adjacent farmland habitats (Table 1). In 616 hr of observations at 44 trees of the closely related *C. Durandii*, Kirika and his colleagues (2008) recorded 19, 25, and 21 bird species feeding on its fruits in three forests in Uganda and Kenya. We did not record two species (Waller's *Onychognathus walleri* and Kenrick's *Poeoptera kenricki* starlings) during the 387 minutes of focused observations at two trees, but encountered them feeding at the other tree observed opportunistically in 2001 (Table 1). It is therefore likely that other species of fruit-eating birds in the East Usambara Mountains consume fruits of *C. gomphophylla*, but were not recorded during this study because of the comparatively limited time frame of our observations. Also, data for this study were gathered in the mid- to late-afternoon when fruit-eating activity is generally lower than in the morning (e.g., Dowsett-Lemaire 1996). Indeed, seven species found in the East Usambaras (Olive Pigeon *Columba arquatrix*, Tambourine Dove *Turtur tympanistria*, Usambara Thrush *Turdus [olivaceus] roehli*, Cabanis's Greenbul *Phyllastrephus cabanisi*, Violet-backed Starling *Cinnyricinclus leucogaster*, Dark-backed Weaver *Ploceus bicolor*) are known to eat *Celtis* fruits of similar size elsewhere in Africa (Rowan 1983, Urban *et al.* 1986, Dowsett-Lemaire 1988, Urban *et al.* 1997, Kirika *et al.* 2008), but were not observed eating the fruits of *C. gomphophylla* during this study.

Our observations of loose flocks of Banded-green Sunbird regularly visiting and consuming *Celtis* fruits (Figure 1) are of particular interest. This behaviour has been only infrequently reported for other sunbird species in Africa (Dowsett-Lemaire 1996, Fry *et al.* 2000). However, fruit-eating by Banded-green Sunbird may not be uncommon: this species has also been observed consuming similar sized fruits of *Zanthoxylum gilletii*, *Macaranga* and *Rubus* species: (Fry *et al.* 2000, pers. obs.). Furthermore, Dowsett-Lemaire's (1996) observations of 10 sunbird species eating fruits of at least three tree species in the Congo basin suggest that some members of this family may have important seed dispersal roles for tree species with relatively small fruits.

Figure 1. Banded-green Sunbirds *Anthreptes rubritorques* (left: male; right: female) feeding on fruits of *Celtis gomphophylla* (Ulmaceae) in Tanzania. Photo: N.J. Cordeiro

Our observations were that all species swallowed fruits whole and spent relatively short periods feeding in the trees (< 1 to 10 minutes). Therefore, all bird species observed during this study are potential seed dispersers of *C. gomphophylla*. More extensive research will be needed to quantify seed removal rates and determine the relative contributions that these fruit-eating sunbirds, as well as the other species, make toward seed dispersal and forest regeneration in the study area.

Acknowledgements

We are grateful to the Tanzania Commission for Science and Technology, Amani Nature Reserve, and Tanga Regional Forest Office for research permission and overall assistance. This research was supported in full or in part by the Wildlife Conservation Society, the Chapman Memorial Fund, the Explorers Club, Sigma Xi and the University of Illinois at Chicago. Comments from N. Farwig, V. Lehouck, J. McEntee, D.C. Moyer, M. Muchai, H. Reers and T. Spanhove improved this note. L. Borghesio helped create the figure.

References

Dowsett-Lemaire, F. 1996. Avian frugivore assemblages at three small-fruited tree species in the forests of northern Congo. *Ostrich* 67: 88-89.

Fry, C.H., Keith, S., and Urban, E.K. (eds) 2000. *The Birds of Africa*. Vol. VI. London: Academic Press.

Kirika, J.M., Farwig, N. & Böhning-Gaese, K. 2008. Effects of disturbance of tropical forests on frugivores and seed removal of a small-seeded Afrotropical tree. *Conservation Biology* 22: 318-328.

Rowan, M.K. 1983. *The doves, parrots, louries and cuckoos of southern Africa*. Cape Town: John Voelcker Bird Book Fund.

Schulman, L., Junikka, L., Mndolwa, A. & Rajabu, I. 1998. *Trees of Amani Nature Reserve*. The Ministry of Natural Resources and Tourism, Tanzania.

Snow, D.W. 1981. Tropical frugivorous birds and their food plants: a world survey. *Biotropica* 13: 1-14.

Urban, E.K., Fry, C.H. & Keith, S. (eds) 1986. *The Birds of Africa*. Vol. II. London: Academic Press.

Urban, E.K., Fry, C.H. & Keith, S. (eds) 1997. *The Birds of Africa*. Vol. V. London: Academic Press.

Norbert J. Cordeiro*

Department of Biological Sciences mc066, University of Illinois at Chicago, 845 West Taylor Street, Chicago, IL 60607, USA

* Current address: *Department of Biological, Chemical, and Physical Sciences, Roosevelt University, Chicago, IL 60605, USA. E-mail for correspondence: ncordeiro@roosevelt.edu*

Billy J. Munisi

College of African Wildlife Management (Mweka), P.O. Box 3031, Moshi, Tanzania E-mail: usambaraeagleowl@yahoo.com

Scopus 28: 37-40, December 2008
Received January 2008

Notes on the nesting and breeding behaviour of the Grey-crested Helmet-shrike *Prionops poliolophus* around Lake Naivasha, Kenya

The Grey-crested Helmet-shrike *Prionops poliolophus* is a social and cooperatively breeding species. It is an uncommon East African endemic (Lewis & Pomeroy, 1989), restricted to the savannah woodlands of Serengeti-Mara ecosystem of southern Kenya and northern Tanzania, one of the world's Endemic Bird Areas (Stattersfield *et al.* 1998). It is listed as Near-threatened in the IUCN Red List as evaluated by Birdlife International (Birdlife International 2008). In spite of this interesting social and cooperative behaviour in which all members of a group, including juveniles, help with breeding activities, little is known about their basic breeding biology. Basic information such as incubation and nestling periods is still lacking.

The breeding activities of 12 groups of the Grey-crested Helmet-shrike were recorded between September 2003 and March 2004 around Lake Naivasha, Kenya, 36° 21′E 0° 46′S. Sixteen nests were located built by eight of the 12 groups (Table 1). Nests were found between September and December. At the onset, only 2 to 3 individuals (perhaps the dominant members) engaged in the nest building activities, with the rest of the group joining afterwards. During the nest building period, the birds were very conspicuous and vocal, making distinct calls around the nest site. Typically, when not distracted, they returned to the same spot repeatedly to collect nesting materials, often using the same route back to the nest. Nest building and lining continued during the incubation period up until the first hatching. Each individual coming in for their incubation shift brought cobwebs and fixed the nest to keep it firm.

Although there were several tree species available in the study area, nests were exclusively placed in two tree species: *Acacia xanthophloea* and *Tarconanthus camphoratus*, perhaps due to their better cover for nest concealment. The nest consists of a supporting framework on a horizontal forked branch, and is about 35-50 mm in diameter and 14 mm in depth. It has the shape of an open cup with courser material (such as *T. camphoratus* bark) used for the framework and finer materials (cobwebs) lining the inside. The nest cup is plastered to a smooth finish with cobweb. The outer wall of the nest is entirely covered with cobweb, which is also used to bind the nest to the branch. The height of the nest above the ground varied with habitat and site; nests were typically between 3 and 5 metres high in *T. camphoratus* bushland, going up to 18 to 20 metres in *A. xanthophloea* woodland.

Table 1. Grey-crested Helmet-shrike breeding attempts and fate around Lake Naivasha during the study period. Different groups have distinct names which include numbers (which denote different groups in the same general area), whereas re-nesting attempts are denoted with capital letters A, B, C or D.

Nest no	Nest code	Date found	State found	Fate	Nature of Predation
1	Lion1_A	25-Sep-03	Nest building	Predated	Egg
2	Lion1_B	20-Oct-03	Nest building	Successful	Successful
3	Lion2_A	25-Sept-03	Nest building	Predated	Egg
4	Lion2_B	6-Oct-03	Nest building	Predated	Egg
5	Lion2_C	10-Oct-03	Nest building	Predated	Egg
6	Lion2_D	5-Nov-03	Nest building	Predated	Egg
7	Lodge	15-Oct-03	Incubation	Successful	Successful
8	Lodge2	22-Dec-03	Incubation	Successful	Successful
9	Mundui	14-Oct-03	Nest building	Successful	Successful
10	Nyati_A	19-Sep-03	Nest building	Predated	Egg
11	Nyati_B	20-Oct-03	Nest building	Predated	Egg
12	Nyati_C	12-Nov-03	Nest building	Predated	Egg & Nestling
13	Nyati_D	17-Nov-03	Nest building	Predated	Nest disturbed
14	Power1	10-Sep-03	Nest building	Predated	Nestling
15	Power2_A	24-Sep-03	Nest building	Predated	Egg & Nestling
16	Power2_B	20-Oct-03	Nest building	Predated	Egg

The egg is oval in shape, with a pale blue background and reddish brown streaks concentrated at the blunt end, almost forming a ring. Grey-crested Helmet-shrikes usually lay a clutch of 3-4 eggs; a maximum of seven eggs was recorded in this study. It is very likely that they lay two clutches in one nest. This was deduced from one of the groups where the number of eggs increased from 0 to 7 within four days, with the eggs showing slight variation in size. Thus, it was possible that more than one female was laying the eggs, since eggs were typically laid at intervals of 1-2 days (Malaki 2004).

Incubation period ranged from 16 to 18 days (n = 4) with an average of 17 days (Table 2). Incubation was shared among all members in the group including the juveniles, at intervals ranging between 30 and 120 minutes. Similar cooperative behaviour was observed during the nestling period, with the group members visiting the nest at intervals, either to feed or brood the nestlings. While doing so, they drew attention to themselves and to the rest of the group by calling frequently. The bird taking over the shift was often escorted towards the nest by the rest of the group. However, not all group members reached the nest, most stayed at a distance of about 10-30 m away and only the one taking over going to the nest. Nest visits became more frequent towards the end of the incubation period and nest was never left unattended for more than 2 hours.

Group size	Incubation period (days)	Nestling period (days)
4	18	24
4	18	24
6	17	22
17	16	22

Table 2. The group size, incubation and nestling periods of four different groups of the Grey-crested Helmet-shrike around Lake Naivasha.

Sixteen nests were located in total, of which one was disturbed before any eggs were laid; eight were predated during egg stage, two had some eggs predated but continued to incubate till the rest hatched but both were then depredated, one was predated during the nestling stage and four successfully fledged (Table 1). Re-nesting was observed after predation incidences, with four out of the eight groups observed having two or more nesting attempts after nest disturbance or egg/nestling predation (Table 1). None of the groups re-nested on the same tree after predation, always moving some distance away from the original tree. Up to four re-nesting attempts were observed for a single group (see Lion2 and Nyati groups in Table 1). For these groups, after the fourth attempt, the birds were never observed nesting during the period of this study. However, in one other group (Lion1) where re-nesting was observed, the second attempt was successful.

Once the chicks hatched, all members of the group took turns to feed and brood the nestlings; typically, the last to feed was left at the nest to brood. As with the incubation, the birds drew attention to themselves during nest change-overs. The size of the food brought to the nest varied with species and type; common prey was insect larvae, grasshoppers and praying mantis. The size of food given to the nestlings remained largely constant throughout the fledging stage, with only the frequency of nest visits increasing as the chicks grew older. Visits were typically made every 10-15 minutes and always involved the entire group, including the juveniles. The nestling period measured as the time between hatching of the last chick to when the last chick left the nest, was recorded for only four nests and averaged 23 days (Table 2).

The Grey-crested Helmet-shrikes seemed selective because they nested in specific trees within these habitats. In a broader study (Malaki 2004), several vegetation structure variables were measured and compared in nest and non-nest sites e.g. canopy cover, bush cover and canopy height amongst others. Significantly higher values (indicating greater foliage density and higher canopy cover) were found in sites selected for nesting compared to those without nests (Malaki 2004). Indeed, vegetation structure is a dominant factor in habitat selection by birds (Karr & Freemark 1983, Muchai 2002). For instance, higher foliage density is thought to improve nesting success by providing better concealment, inhibiting predator search, or hindering nest discovery through impeding transmission of chemical, visual and auditory cues (Krams 2000). Selection for greater foliage cover may also be associated with an enhanced thermal environment of nest microhabitat (Walsenberg

1985), leading to reduced likelihood of heat and cold stresses, thereby enhancing nest success.

Although based on a fairly small sample size, it is notable that chicks in the larger groups had slightly shorter nestling period, while chicks in the smallest group had the longest nestling periods (Table 2). This could suggest that more helpers in a group may accelerate chick growth by providing extra food. However, the effect on the nestling period is not unequivocal because the group of six seemed to negate this, fledged within the same period as the group of 17. It is possible that the positive helper-effect might have a threshold beyond which chick growth reaches its physiological ceiling and cannot be accelerated further. Still, additional helpers may indeed help the (focal) breeding pair (by reducing the time they spend incubating, as well as the effort they need to exert to feed the nestlings). This is likely to positively impact on their fitness and survival in the long-term, even without having a significant impact on chick growth per se together with factors governing habitat (and tree) selection, this fascinating group behaviour and potentional ramifications on individual survival and fitness are fertile grounds for long-term research.

Acknowledgements

We wish to thank Lord and Mrs Enniskelin and Mr. P. Swagger for kindly allowing us access to Mundui and Kongoni Farms respectively. The management of Kongoni Game Sanctuary for their cooperation is acknowledged. Thanks to Dr. and Mrs. Geffrey Irvine for their assistance while in Naivasha. Mr. and Mrs. Shell Harrison provided accommodation. Richard Waweru and Albert Chesoli helped with data collection. This study was funded by SIDA-SAREC though Research Program on Utilization of Dry Land Biodiversity (RPSUD).

References

BirdLife International 2008. *Species factsheet: Prionops poliolophus*. Downloaded from http://www.birdlife.org on 7/11/2008.

Karr, J.R. & Freemark, K.E. 1983. Habitat selection and environmental gradients: dynamics in the "stable" tropics. *Ecology* **64**: 1481-1494.

Krams, I. 2000. Perch selection by singing chaffinches: a better of surroundings and the risk of predation. *Behav. Ecol.* **12:** 295-300.

Lewis, A. & Pomeroy, D.E. 1989. *A Bird Atlas of Kenya*. A. A. Balkerma Publishers, Rotterdam.

Malaki, P.A. 2004. *Population status and behaviour of the Grey-crested Helmet-shrike in Naivasha, Kenya*. MSc. Thesis, Addis Ababa University, Addis Ababa, Ethiopia.

Muchai, S.M. 2002. *Going through the motions: the impacts of frequent fires and grazing pressure on reproduction by montane grassland birds. Ph.D. Thesis*. Percy FitzPatrick Institute, University of Cape Town, Cape Town.

Stattersfield, A.J., Crosby, M.J., Long, A.J., & Wege, D.C. 1998. *Endemic Bird Areas of the world: priorities for biodiversity conservation*. Birdlife International, Cambridge.

Walsenberg, G.E. 1985. *Physiological consequences of microhabitat*. In: Habitat Selection in Bird. pp. 389-413 (Cody, M.L. ed), Academic Press Inc., Orlando.

Philista Malaki* & Muchai Muchane
National Museums of Kenya, Department of Zoology, P. O. Box 40658, GPO 00100 Nairobi, Kenya; E-mail: phillista@yahoo.com & mmuchaim@yahoo.com
** corresponding author*
M. Balakrishnan
Addis Ababa University, Department of Biology, P.O. Box 31226, Addis Ababa, Ethiopia

Scopus 28: 41-45, December 2008
Received April 2007

New records for Orange-winged Pytilia *Pytilia afra* in Central Kenya

The Orange-winged Pytilia *Pytilia afra* (a.k.a. Golden-backed Pytilia) is a colourful estrildid finch with a widespread occurrence in Africa, where it is found in the northeast (Sudan, Ethiopia), east (Kenya, Uganda, Tanzania, Burundi, Rwanda), southeast (Mozambique, Malawi), south (Botswana, South Africa, Zambia, Zimbabwe) and central regions (Angola, Congo, The Democratic Republic of the Congo). Within its 2.3 million km^2 range it is often listed as uncommon (BirdLife International 2008). Though its global population has not been quantified, there is evidence of a likely population decline (Fry *et al.* 2004). Nevertheless, the species is not believed to approach the thresholds for the population decline criterion of the IUCN Red List (i.e., declining more than 30% in ten years or three generations), and it is therefore listed as 'Least Concern' (BirdLife International2008).

In Kenya, Orange-winged Pytilia was formerly listed as an uncommon and local Kenyan resident, but is now regarded as 'rare, perhaps largely extirpated by habitat change' (Zimmerman *et al.* 2005). Stevenson & Fanshawe (2002) describe the species as 'local and generally uncommon in much of its East African range'. Kenyan specimens are known from the coastal region (Lamu, Arabuko-Sokoke Forest and Mombasa), and inland near Voi, Kikuyu, Murang'a, Ngong Escarpment and Mt. Kenya. According to Zimmerman *et al.* (2005), the species has not been recorded in Central Kenya for the past 50-75 years, although there have been four post-1960 records from Kilifi (1968), Shimba Hills (1990), Kongelai Escarpment (1989) and northeast Mt. Elgon (1994).

Orange-winged Pytilia are described as residents of forest edge, miombo woodland and moist wooded grasslands from sea-level to 1800 m, avoiding dry areas (Stevenson & Fanshawe 2002). The species reportedly feeds on the ground in pairs or small groups, mostly on small seeds (Zimmerman *et al.* 2005), or on grass seeds and insects (FOM 1998). Although the species is rare and has largely disappeared in Kenya, two new records confirm that Orange-

winged Pytilia has not been extirpated in its Central Kenyan range.

The first of these was by the first author at the Lewa Wildlife Conservancy (LWC) in Central Kenya, who had an excellent sighting of a pair of Orange-winged Pytilia on the late morning of 9 August 2006. The birds were observed feeding on the ground and were not shy, and the author was able to observe them from a distance of 8-12 m for at least five minutes and take digital photographs. The site was located on the northeastern boundary of LWC (0º15′20″N, 37º30′56″E), and consisted of a dry river bed lined with mixed acacia species (*Acacia tortilis, A. drepanolobium, A. mellifera*), *Commiphora* and *Grewia*, at an altitude of 1445 m. A perennial freshwater stream was located nearby at about 150-200 m, as were agricultural fields with beans and maize (> 200 m distance).

The second observation was by the second author at the 18 km^2 Ol Donyo Sabuk National Park, managed by Kenya Wildlife Service. The park is located 25 km east of Thika and primarily consists of the Ol Doinyo Sabuk Mountain, which is an isolated mountain that rises to 2146 m a.s.l. Forest on the eastern slopes is dominated by *Albizia, Podocarpus, Ficus, Olea* spp. and *Acacia abyssinica,* along with *Tabernaemontana stapfiana, Croton macrostachyus, Rhus natalensis* and *Rubus* spp. in patches of secondary shrubland in disturbed patches and along the roads. Open patches of bush, scrub and grassland clearings on the western slopes are dominated by *Acacia drepanolobium, Lantana camara* and *Carissa edulis*.

The birds were seen on 14 January 2007 while the author was going up the track leading to the mountains' summit. Half way up a finch-like bird was noticed feeding along the road. At first, a female was observed, which could have been the more common Green-winged Pytilia, but the habitat was wrong and the bird appeared too dark grey. Luckily, the male soon joined the female, and identification was unmistakable, because it had red on the whole face and not extending halfway down the neck. The author was able to observe both birds for about 20 minutes and take photographs.

Acknowledgements

Wim Giesen would like to sincerely thank Lewa Wildlife Conservancy for being given the opportunity to carry out a habitat survey in July-August 2006. Don Turner provided helpful remarks on an earlier draft of this manuscript.

References

BirdLife International 2008. BirdLife International's datazone website: http://www.birdlife.org.

Bennun, L. & Njoroge, P. 1999. *Important Bird Areas in Kenya*. East African Natural History Society, Nairobi.

EANHS 1996. *Checklist of the Birds of Kenya*. Third Edition. Nairobi.

FOM 1998. Finch of the Month: http://members.ozemail.com.

Fry, C. H., Keith, S., Urban, E & Woodcock, M. (Eds) 2004. *The Birds of Africa*. Vol. 7. London: Christopher Helm.

Stevenson, T. & Fanshawe, J. 2002. *Field Guide to the Birds of East Africa–Kenya, Tanzania, Uganda, Rwanda and Burundi*. T & A D Poyser, London, 604 pp.

Zimmerman, D.A., Turner D.A. & Pearson D.J. 2005. *Birds of Kenya and northern Tanzania*. Helm Identification Guides, A & C Black, London.

Wim Giesen
Mezenpad 164, 7071 JT Ulft, The Netherlands; E-mail: wim.giesen@mottmac.nl
Chege wa Kariuki
Ornithology Section, Department of Zoology, National Museums of Kenya, P.O. Box 40658 00100, Nairobi; E-mail: chege@birdwatchingeastafrica.com

Scopus 28: 45-47, December 2008
Received March 2008

Scopus memoir: some titbits and anecdotes

Recently, I undertook a research project that required me to look for certain records in all previous issues of *Scopus*. What I thought was going to be a tedious undertaking, wading through dust-filled long-forgotten issues, turned out to be a very interesting glance at the history of *Scopus*. As a relative newcomer to East African Ornithology, I could not help but be mesmerized by the stories that these old issues had in store. So I felt compelled to share some of the top-ten gems, interesting discoveries together with various personal thoughts I made along the way that may help us along the journey to sustain *Scopus*.

1) The initial volume of *Scopus* in 1978 cost KSh 15! (US$ 0.20) (Current cost is KSh 800 or $10.40)
2) A closer look at the old issues reveals that they were done on a typewriter—you get a sense of the dedication that previous editorial teams put into *Scopus*. These issues were complete, with indexes to all authors of the previous years' issues, full lists of *Scopus* subscribers, and pages and pages of the past years' records meticulously analysed, sorted and typed. What an effort!
3) There even used to be a '*General Review*' of the year, which summarised climatic conditions, Palaearctic sightings, etc. This was an extremely useful section for ensuring that odd natural events are captured; for instance, how many of us can recall the intensity of rainfall from say 1986?
4) *Scopus* used to cover a much broader range of countries than just Uganda, Tanzania and Kenya where most of today's papers come from. Older issues contained extremely interesting records from Sudan, Ethiopia, Somalia, Malawi and Burundi –we ought to strive to revive this trend.

5) Unfortunately, the number of subscribers seems to be always going down, down, down. A list of subscribers used to be published in the journal and it regularly ran to 4 pages! Sad to say that such a list today would be lucky to fill a single page. Besides, unlike presently, *Scopus* had no shortage of institutional subscribers back in the day.
6) *Scopus* evolved from publishing mostly records data in the form of sightings and ringing data, to publishing more ecological research today.
7) Additionally, as the world has changed, so has the longevity of research. In the early *Scopus* days it wasn't unusual to come across continuous, almost lifelong, natural history articles, such as 'records from the past 30 yrs of watching a pair of goshawks!' What happened to natural history?
8) Speaking of which, it is clear that the Tanzanian Bird Atlas has been a life-long endeavour! Hats off to the indefatigable Bakers—Neil and Liz—for their sustained efforts in this initiative.
9) While some authors come and go, quite a few have continually published in *Scopus* though the years.
10) Without a doubt, the saddest part of reviewing old issues was to see how rapid and dramatic the decline in the numbers of some bird species has been in our region. A simple comparison of the map of the number and locations of African Fish Eagle nests in Lake Naivasha from A. Smart (1991) and what Dr. Munir Virani is finding today forcefully drives this point home

Oh, and the call of the Red-chested Cuckoo does not actually predict a rainy day. Yes, that was an interesting paper by H.T.T. Prins in Vol. 12 No.3/4 March 1989. Seriously!

Darcy Ogada (Editorial Assistant, *Scopus*)
Email: darcyogada@yahoo.com

servation evaluation for birds of *Brachylaena* woodland and mixed dry forest in north-east Tanzania. *Bird Conservation International* 10: 47–65.

Stuart, S.N., Jensen, F.P., Brøgger-Jensen, S. & Miller, R.I. 1993. The zoogeography of the montane forest avifauna of eastern Tanzania. Pp. 203–228 *in* Lovett, J.C. & Wasser, S.K. (eds) *Biogeography and ecology of the rainforests of Eastern Africa*. Cambridge: Cambridge University Press.

Urban, E.K., Fry, C.H. & Keith, S. (eds) 1986. *The birds of Africa*. Vol. 2. London: Academic Press.

Both English and scientific names of birds should be given when the species is first mentioned–in the title and in the text–thereafter, only one name should be used. Bird names should be those of a stated work. Any deviations from this work should be noted and the reasons given. Original black-and-white photographs and line illustrations should not be larger than A4 (210 x 297 mm). Line illustrations should be on good quality white paper or board, or on tracing material, with lettering of professional quality (if this is not possible, label an overlay, not the original figure). Copies of graphics as separate electronic documents (files) in JPEG, TIFF or EPS format are appreciated. All articles should be submitted by email or on paper (two copies) with a copy on disc as a Rich Text Format (RTF) file; submission by email is preferred. Hard copies should be printed on one side of the paper only with wide margins all around.Authors of full papers and short communications receive a PDF copy of their article *gratis*. Any paper copies, charged at cost, must be ordered when the MS is accepted.

Please send all contributions to:
Mwangi Githiru, The Editor, *Scopus*, c/o Ornithology Section, Department of Zoology, National Museums of Kenya, P.O. Box 40658 00100, Nairobi, Kenya
E-mail: mwangi_githiru@yahoo.co.uk

Rare birds in East Africa
Records of rare birds from Kenya, Tanzania and Uganda are assessed by the East Africa Rarities Committee. Records from other countries in the region can also be submitted for review and possible publication in Scopus. A full account of the record should be sent to the Scopus editor at the address above or to East Africa Rarities Committee, c/o Nature Kenya, P.O. Box 44486, G.P.O. 00100, Nairobi, Kenya.
Tel. +254 20 3749957.
E-mail: jeremy.lindsell@rspb.org.uk

Ringing scheme of eastern Africa
This covers several countries in the area. Qualified and aspiring ringers should contact the ringing organizer, Bernard Amakobe, Ornithology Section, Zoology Dept. National Museums of Kenya P.O. Box 40658, 00100-Nairobi, Kenya.
Tel. +254 20 3742161 ext. 243
E-mail: scopumbre@yahoo.com

EANHS Nest Record Scheme
Details of most kinds of breeding activity are welcomed by the scheme and nest record cards may be obtained free of charge from the Nest Record Scheme organizer, EANHS, P.O. Box 44486 00100, Nairobi, Kenya. Tel. +254 20 3749957.
E-mail: office@naturekenya.org

The BirdLife International Partnership in eastern Africa
Through its national partners, the BirdLife International Africa Partnership Secretariat in Nairobi co-ordinates bird conservation work in the region and produces several other publications of interest to ornithologists.

Ethiopian Wildlife & Natural History Society, P.O. Box 13303, Addis Ababa, Ethiopia. Tel.+251-(0)2-183520
E-mail: ewnhs@telecom.net.et

The East Africa Natural History Society:

Nature Kenya, P.O. Box 44486, Nairobi.
Tel.+254-(0)2-3749957/3746090,fax 3741049. E-mail: office@naturekenya.org

Nature Uganda, P.O. Box 27034, Kampala,
Tel. +256-(0)41-540719, fax 533528.
E-mail: eanhs@imul.com

Wildlife Conservation Society of Tanzania,
P.O. Box 70919, Dar es Salaam.
Tel.+255-(0)22-2112518/2112496,fax 2124572.
E-mail: wcst@africaonline.co.tz

Scopus 28, December 2008

Contents

Short communications

Scopus memoir

Printed by Colourprint Ltd., Nairobi, Kenya.